THE MARION LINE

Soot Blowers

FOR

Water Tube and
H. R. T. Boilers

All Inquiries Should Be Addressed To

H. O. TRERICE CO.

District Managers

1338 W. Lafayette Blvd., DETROIT, MICH.

TELEPHONE
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Night Calls
Garfield 3460-W

SECTION A

THE MARION LINE

SOOT BLOWERS

Patented and Patents Pending

FOR WATER TUBE BOILERS

Type "AB" Soot Blower

Type "A" Soot Blower

Type "EB" Special Soot Blower

Type "E" Special Soot Blower

FOR H. R. T. BOILERS

Marion Duplex Soot Blower

Marion Type "C" Soot Blower

Marion Rotary Soot Blower

REPRESENTATIVES LOCATED IN ALL IMPORTANT CITIES

Marion Machine, Foundry and Supply Company

Marion, Indiana, U. S. A.

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WAR ON WASTE

"Competition is the life of trade but WASTE IS BUSINESS SUICIDE to him who would compete."

So important are the economies effected by the elimination or minimizing of the ravages of waste that the United States Government found it advisable to foster a Commission on Waste in Industry. The nation wide efforts to cut down losses or waste from inefficient practices have resulted in greater production, lower costs and higher wages.

It is the purpose of this catalogue to call to your attention one manner in which there is a tremendous but easily preventable loss in the steam power plants and with pictures and description, show the mechanical equipment with which these insidious losses can be prevented.

ENERGY OF COAL

There is enough energy in one pound of coal, if it could be utilized to lift a two hundred ton locomotive twenty-eight feet high. It could lift one ton over a mile high. If all of it could be converted into useful energy, it would drive a three thousand ton ship a mile, so it is apparent that anything that will completely harness this potential energy will be a big paying investment in dollars and cents besides the satisfaction that comes from efficient operation.

BOILER ROOM LOSSES

The average Steam Power Plant of one thousand to two thousand horse power loses twenty-six percent of all the heat of the coal in the hot chimney gases; only three percent is being actually used in manufacturing. This is the result in a plant with all the best equipment for saving all of the energy possible. The Goverment Bureau of Mines has prepared an outline showing the distribution of losses in the average plant of the horse power mentioned above. This outline is herewith reproduced:

WHERE THE ENERGY GOES

Furnace and Heat Losses in Ashes

Heat loss in ashes	3%	
Heat loss in dry chimney gases	26%	
Heat loss in moisture	4%	
Heat loss in incomplete combustion	5%	
Heat loss in radiation	5%	
Total heat loss in furnace and boiler		43%

Engine Room Losses

Heat losses in auxiliaries	4%	
Heat rejected to condensor	43%	
Heat loss in friction of steam engine	1%	
Total engine room losses		48%

Factory Losses

Heat loss in friction of transmission	3%	
Heat loss in friction of machinery	3%	
Total friction loss		6%
Total loss boiler, engine and machinery		97%
Energy utilized in manufacturing		3%

EXCESSIVE STACK TEMPERATURE

In checking the furnace losses we see that 60% of the furnace losses is due to the chimney gases. If substantial reduction can be made in the temperature of the chimney gases it will mean a good saving.

With the tubes covered with a layer of soot the heat will not pass through the tube wall as easily as when the tube is clean. This means that a lot of the heat passes up the chimney.

With good combustion it takes about eighteen pounds of air to burn one pound of coal. Each pound of flue gas absorbs one-fourth B. T. U. for each degrees rise in temperature.

If due to dirty tubes the flue gases rise 200 degrees in temperature, there would be a loss of 50 B. T. U. for each pound of air burned and 900 for each pound of coal burned—which would be about 6-½% of the heat of a good coal. This means a possible saving of one ton in every sixteen tons of coal saved.

For this reason it is necessary that as much as possible of all of the heat in the flue gases be absorbed by the water in the boiler. Any material that will obstruct the passage of the heat from the flue gases to the water will very materially increase the amount of heat passing up the chimney. The following table gives the heat losses due to various stack temperatures:

Stack temperature (Degrees Fahrenheit)	350	400	450	500	550	600	650	700	750
Heat carried away in B. T. U. per pound coal burned	1100	1400	1700	1960	2250	2540	2830	3100	3320

INSULATION

Practically everyone is familiar with asbestos and recognizes the efficiency with which it retards the passage of heat units. Pipes of heating systems are insulated with it in order that the heat may be retained in the heating agency. The housewife uses a pad of asbestos on which to set her hot flat iron. The asbestos so effectually retards the passage of heat that the cloth on the ironing board is not damaged.

Soot, by which is meant the unburned carbon, which accumulates on the water tubes or inside the fire tubes of a boiler, retard the passage of heat units from the furnace gases to the water in about the same degree as if the pipes were covered or lined with a like thickness of asbestos. It is apparent that a much larger amount of fuel must be consumed to get the required steam pressure when the tubes of the boiler are covered with a coating of soot than when they are free from this insulation.

When the tubes are clean, the heat passes very readily and rapidly from the furnace gases to the water so that by the time they have passed through the tubes, the temperature is reduced to just a small amount above the temperature of the water in the boiler. On the other hand, as a very thin coat of soot accumulates on the tubes and the passage of the heat is obstructed and as the coat of soot grows thicker, it retards the heat absorption still more and when a very thick coat has formed, very little heat will pass through this to the water. Therefore the gases are passing out of the chimney at a great deal higher temperature than they should and to maintain the required steam pressure in your boiler, a very large amount of coal is burned that could be saved if the tubes were clean.

LIMITING THE BOILER CAPACITY

If the soot deposits were removed every few hours, the steaming capacity of the boilers would be greatly increased. Not only will clean tubes increase the capacity and flexibility of the boiler, but they make it possible to save 5 to 10 percent on fuel bills.

INDICATIONS OF DIRTY TUBES

All boilers of any size should have pyrometers on them to show the stack temperatures. If the pyrometer shows that the flue gases are running too high in

temperature, this will indicate that the tubes are dirty and the gases do not give up their heat. Cleaning the tubes will immediately restore the flue gases to proper temperature.

METHOD OF CLEANING TUBES

There are two methods of cleaning soot from the tubes. Blowing by hand with a steam lance and blowing by a mechanical steam soot blower, which is a permanent fixture of the boiler.

HAND BLOWING

Blowing the soot from water tube boilers by hand is a disagreeable job and cleans only that section next to the opening. By this method the tendency is to pile the soot up at the back and next to the headers. This method does not actually clean but only removes the soot from one place to another.

The piling up of the soot against the header causes unequal expansion of the tubes and results in the crystallizing of the tubes at the header and they crack off at this point. Experience has shown that thoroughly cleaned tubes will not crystallize.

The hand cleaning method blows crosswise to the path of travel of the gases and therefore does not remove the soot and never cleans the tubes next to the headers.

Not only is the hand method of cleaning boiler tubes inefficient, but there is the ever present danger of bursting the steam hose and injuring the operator. Another serious objection is the fact that the boiler cannot be cleaned while under load.

MECHANICAL BLOWING

To maintain the highest state of efficiency in the boiler, the tubes should be cleaned often. This is impossible under the hand method, therefore the necessity that brought about the mechanical means by which the soot could be swept from the tubes by blasts of dry steam at any time and as often as necessary, with little effort on the part of the operator.

When the soot first collects on the tubes it is loose and fluffy and very easily removed by a blast of steam. If allowed to remain for a comparatively long time the heat will fuse it into a hard clinker which sticks to the tube and can only be removed by shutting down the boiler and removing by means of a tool. Hence the necessity of cleaning the tubes frequently.

The Marion Line of Mechanical Soot Blowers is so varied that one can be found to suit every particular steam power plant and the method of operation so simple that few instructions for using are necessary.

No single piece of equipment will save so much coal as a good system for keeping the boiler tubes clean. Boiler manufacturers make the tubes of the very best quality of thin steel in order too increase the rate of conduction of the heat from the hot gases to the water. A very thin layer of soot will more than counteract all this advantage therefore it is extremely important that the tubes are clean.

The following table shows clearly how insulation retards the flow of heat through the walls of a 2″ pipe containing steam at 100 lbs. pressure (338 degrees F) and air temperature 60 degrees.

Thickness of Insulation	Bare	1-½″	1-¼″	1″	¾″	½″
B. T. U. Conducted per hr. per lineal foot	579	79′	86	99	118	149

MARION MECHANICAL SOOT BLOWERS

The mechanical soot blower is a permanent installation and each unit cleans a certain section of tubes. These blowers are so placed that the tubes are thoroughly cleaned in each pass; using enough units on the boiler to thoroughly clean all the tubes and headers. If the boiler has a superheater a unit will be so placed as to clean this also.

The units are rotative and the distributor elements pass through or over the bank of tubes (in the case of water tube boilers) to the opposite wall. When installing a Marion Soot Blower, our engineers carefully analyze the type of boilers as to the path of the gases and each blower so placed that all parts of the tubes and headers will be thoroughly cleaned and that the blower will not in any way pile up the soot in between the tubes.

The distributing elements of a Marion Soot Blower pass across the banks of tubes. In these elements are located a number of steam nozzles so placed that a jet of high velocity steam passes between rows of the tubes. Enough units are used to reach every part of the tube surface.

These jets of steam blow the soot off the tubes, part of it passing up the stack and the heavier matter settling in the combustion chamber from which it can be removed when desired. The distributor element is so arranged that it can be rotated by mechanical means from the outside of the furnace, and without opening any doors or interfering in any way what-so-ever with the usual routine of the power plant.

Marion distributing elements are operated with a slow steady movement which is necessary to allow the steam ample time to thoroughly clean all parts of the tube.

THE BLOWER ELEMENTS

The distributor elements are very important factors in the success of any mechanical Soot Blower. They must be made of material that will withstand the oxidation from the hot furnace gases and of such a contruction that will direct the jets of steam with great velocity. It is apparent that an element that will leak steam cannot successfully deliver the jet of steam with sufficient force to properly clean the tubes.

Engineers have found that the element which has the nozzle welded internally is the most efficient. They do not come loose from oxidation and drop out. This construction also makes it easier when necessary to install or take out an element, as there are no projections to catch on the clamps, and boiler tubes. It is also important that the end caps of the element should be welded on rather than screwed on. It is a positive safeguard against steam loss and crippling of the blowing efficiency.

The distributing elements should be made of heavy, double strength tubing to withstand the high temperatures of the gases. The nozzles should be made of the same material and placed inside the distributor in such a manner that the whole is one unit. Such an arrangement insures long life to a blower installation.

ECONOMIZERS AND SUPERHEATERS

Economizers are working in much lower temperature than the boilers and it is especially important that they **be kept very clean.** They have a geat deal of surface and therefore collect a very large amount of soot. To make them give the service they are intended to give, requires that they be **kept** clean.

Superheaters are placed in the path of the hot gases and to be effective must have a clean surface. Steam is passing through the superheater rapidly

and if heated to a maximum, the tubes must be absolutely clean. The proper location of the mechanical soot blowers will take care of this.

Economizers and superheaters are put in to save fuel but if not **kept** in a perfectly clean condition they are useless. They should receive the same attention as the boiler.

It is the frequent cleaning of the tubes that makes the apparatus really give the service intended and the cleaner the tubes are **kept** the better will be the service. All this means money to the man who pays for the coal.

HAND WHEEL CONTROL

No matter how efficient the steam nozzle is, if its action is not under perfect **control,** the cleaning will not be successful.

The rotation of the distributor must be slow and **steady,** in order to give the steam jets time to reach every part of the tubes with a good, strong blast and remove every particle of soot and ash and chase them out of the tube space to the combustion chamber or out of the stack.

This is only possible with a reduced gear drive. The hand wheel is attached to a sprocket wheel on the distributor so that several turns are required to rotate the distributor one turn. Besides this, there is the advantage of the large operating wheel giving still more leverage.

The reduced gear gives a perfect **control** of the steam nozzle and all parts of the tubes are perfectly cleaned; what is more, it is accomplished with perfect ease.

PIONEERS IN THE MANUFACTURE OF SOOT BLOWERS

Our company was one of the first to see the need of a quick and easy means for removing the soot from the Boiler Tubes and in 1907 brought out the Marion Rotary Soot Blower for H. R. T. boilers, and since that time have added many improvements. Our company owns basic patents on Soot Blowers issued in 1895.

The following important improvements on Soot Blowers have been brought out:

THE REDUCTION GEAR for rotating the element—brought out in 1918.

THE INTERNAL WELDED NOZZLE brought out in 1918. This is a very important feature.

THE BALANCED HEAD construction which eliminates all end thrust of the element on the head. The QUICK OPENING valve for high settings.

The following pages will give a detailed description of the various types of soot blowers made by us.

MARION LINE SOOT BLOWERS

The Marion Line of Soot Blowers for Water Tube Boilers are made in four different types.

Type "AB" Soot Blower

Types "AB" Balanced Head Soot Blower for high settings. It has a quick opening valve next to the blower head with the valve lever near the operating floor. It is also equipped with an operating hand wheel at the operating floor.

Type "A" Soot Blower

The Type "A" Balanced Head Soot Blower for standard and low set boilers. This blower uses a standard globe valve next to the operating floor. The operating hand wheel is the same as that of the Type "AB" and located at the operating floor.

Type "EB" Special Soot Blower

The Type "EB" Special with a standard head for high settings. A quick opening valve is placed next to the head with the valve lever at the operating floor. The element is rotated by means of a chain extending to the operating floor.

Type "E" Special Soot Blower

The Type "E" Special with a standard blower head for standard and low settings. A Standard globe valve is placed next to the operating floor. The element is rotated by means of a chain extending to the operating floor.

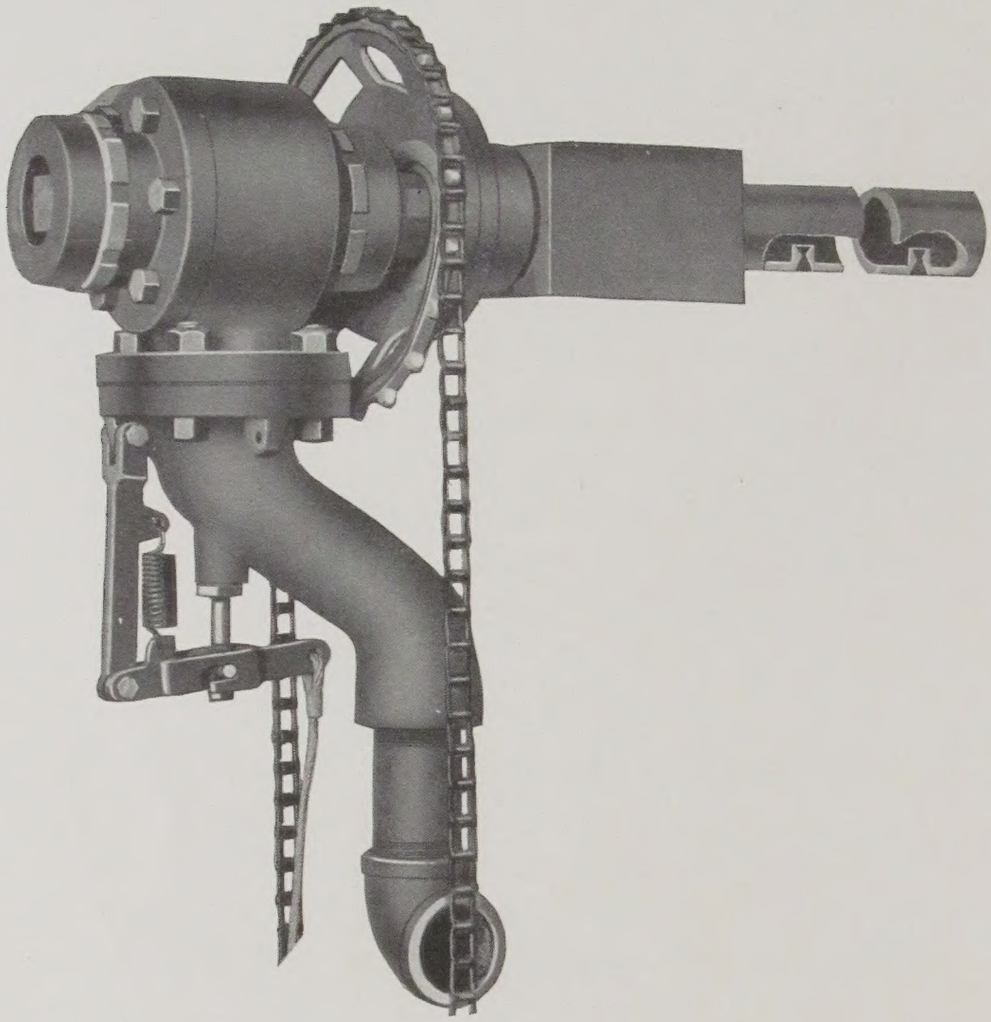


Fig. 1

MARION TYPE "AB" SOOT BLOWER

Valve-at-Head, Independently Operated

This type of blower is designed for water tube boilers. The Marion Type "AB" Soot Blower System consists of a permanent installation of units located in fixed positions to fit the design of the various boilers to which they are attached and are applicable to practically every type of water tube boiler, economizer, super-heater or pre-heater.

The principal features of Marion Type "AB" Soot Blowers are the Blowing Head, Valve-at-Head, Independently operated, Blower Elements, Swivel Tube and Sheave Wheel with reduction gear control.

The Blowing Head is known as the balanced head type. This balanced head eliminates end thrust which causes shifting of element and strain of the stuffing box and also stops the severe squeezing of the packing and strain on the gland.

The Valve-at-Head independently operated, provides a quick and efficient method of cleaning the tubes. The valve is located in the flange at the top of the offset bend and is operated by means of a hand lever on riser pipe. A downward stroke of the lever fully

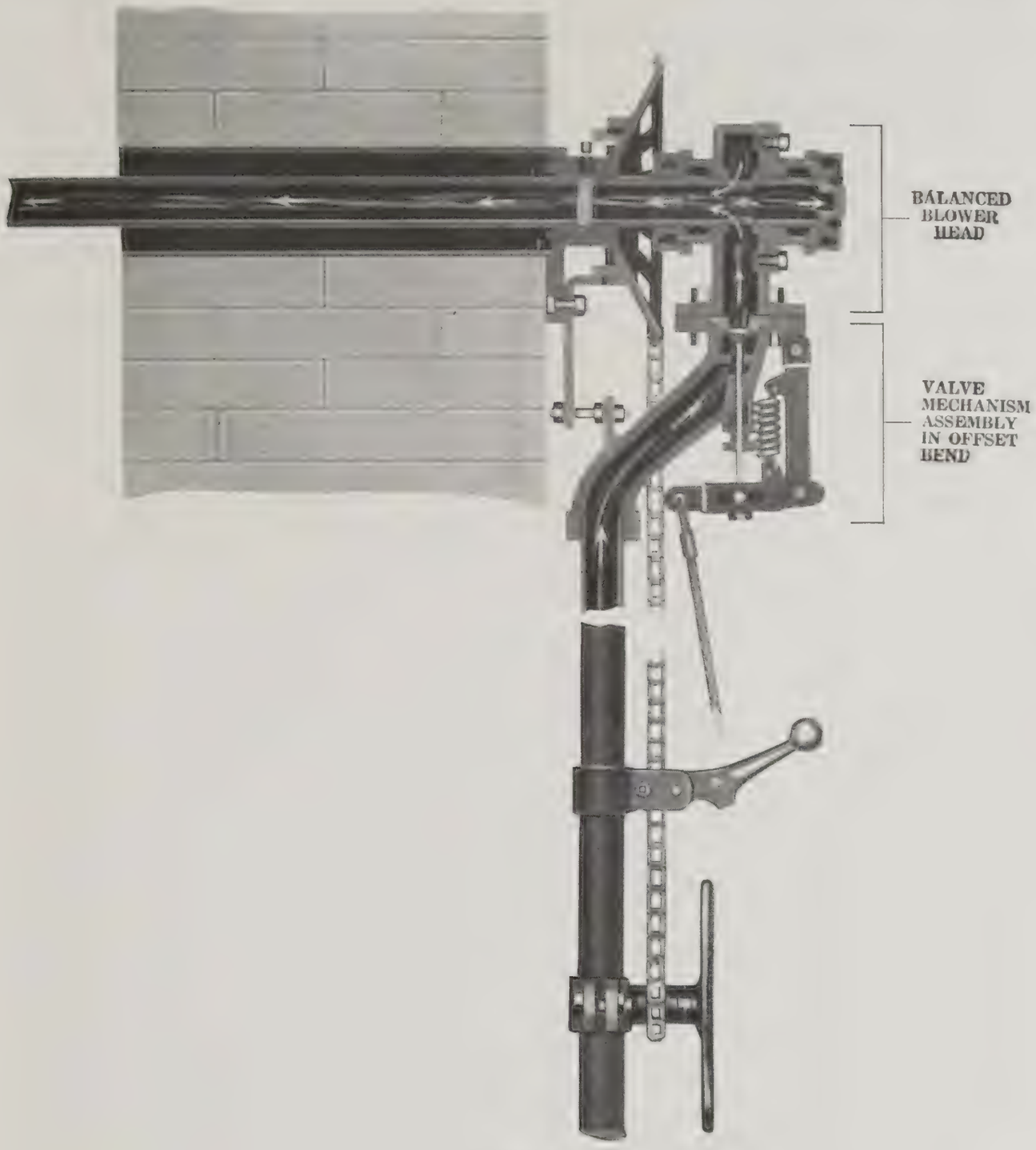


Fig. 2

Cross-Section View of Marion Type "AB" Soot Blower

opens the valve and releases the steam into the element. When the blowing arc is completed, an upward thrust of the lever closes the valve tight, and the pressure of the steam in the riser pipe keeps it tightly in position in the valve seat. The steam is released in the blowing elements before these start to rotate and is shut off after they have traversed their entire arc, therefore, every inch of the arc is cleaned of soot. With Marion Type "AB" Soot Blower,

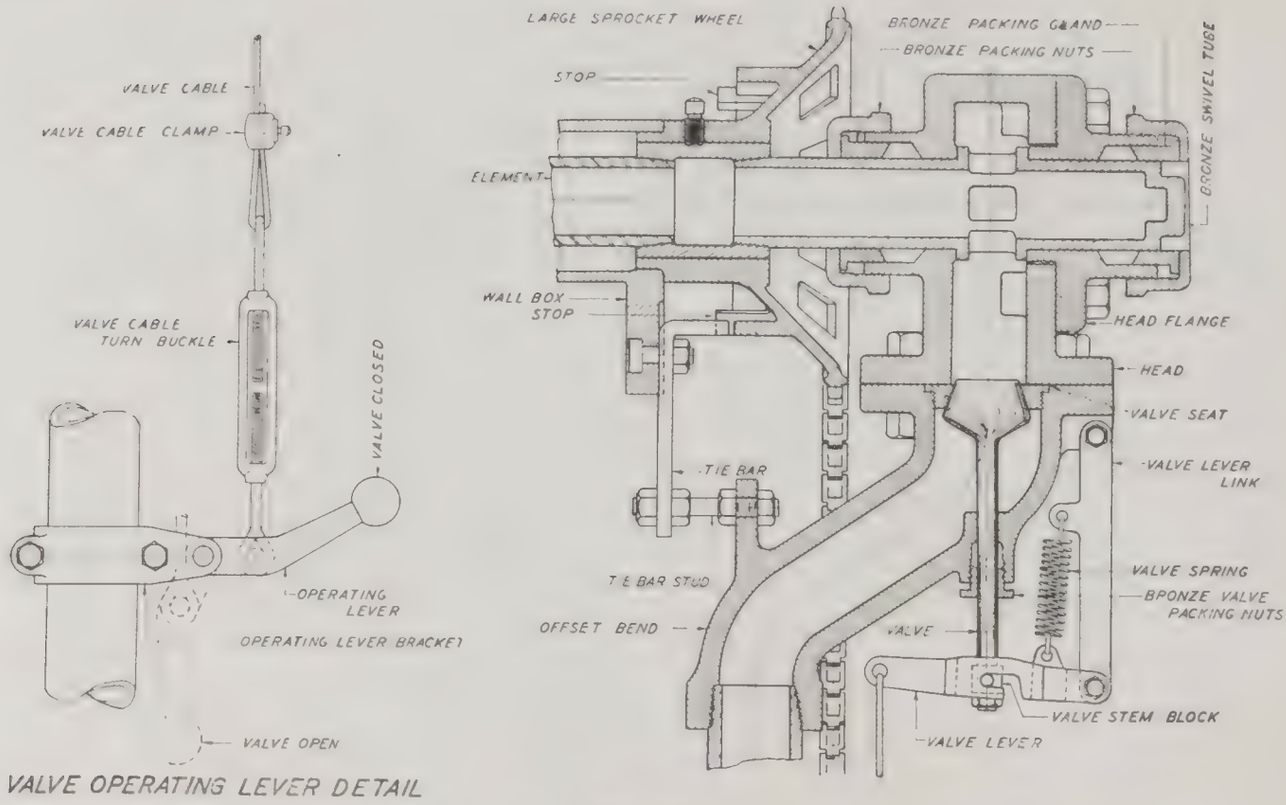


Fig. 3

Detail Drawing of Marion Type "AB" Soot Blower

Valve-at-Head, independently operated, there can be no dirty corners as is the case where the blowing element starts to rotate before the valve is completely opened, and the valve begins to close before the element has traversed the entire arc.

Marion Soot Blowing systems include elements, which are chosen to suit the temperatures in the various passes in which the elements are placed. Soot Blower elements exposed to high temperatures are constructed of special pipe which will withstand a melting point temperature of 2800 degrees F. Other elements not exposed to high temperature are made of heavy steel pipe which has a melting point at 2400 degrees. All elements are equipped with venturi internal welded nozzles—the most efficient nozzle known to Engineering practices. These nozzles are so spaced that the blasts of dry steam strike between the first row of tubes and the elements so adjusted that practically sixty percent of the steam from any given nozzle strikes on one side of the second row of tubes and forty percent on the other. It has been found this method most thoroughly scours the tubes.

The Sprocket Wheel with reduction gear control (ratio of about 4 to 1)) insures a thorough cleaning of the tubes with minimum effort on the part of operator. The elements are slowly revolved so that ample time is provided for the steam to efficiently scour the tubes. Stops on the sprocket wheel permit the operator to set the element in such a manner that the blowing will clean the tubes without the steam striking the brick furnace walls and baffles. By means of the sprocket wheel and reduction wheel the operator has complete control of the speed of rotation of the element.

DESCRIPTION OF PARTS

All parts of the Marion Type "AB" Soot Blower are made of semi-steel and bronze castings designed to operate at pressures up to 300 pounds. Those parts made of bronze are the swivel tube, packing glands and head caps.

The gear wheel (sprocket type) illustrated on this page, Fig. 4, shows construction of automatic stops which are provided to limit the arc in which the element or soot blower is to travel. The body (that part of the head forming the steam chest and stuffing boxes) is substantially constructed of semi-steel and carefully machined to permit easy operation as well as a close fit for the bronze swivel tube which is mounted therein between two stuffing boxes, each of which is of sufficient size to accommodate four $\frac{3}{8}$" packing rings. The packing glands are of bronze carefully machined, and the head caps and packing nuts are heavy bronze castings and so designed as to be adjusted with a spanner wrench. The wall casting is made in rectangular box form with bosses to anchor it securely when bricked into the setting. The opening in the face of wall box is machined to accommodate the hub of the gear wheel to form a tight joint preventing the infiltration of air into the setting. The offset bend is flanged construction on one end with a screwed connection to accommodate the steam supply pipe. This offset bend is also made of semi-steel and guaranteed for 300 pounds working pressure.

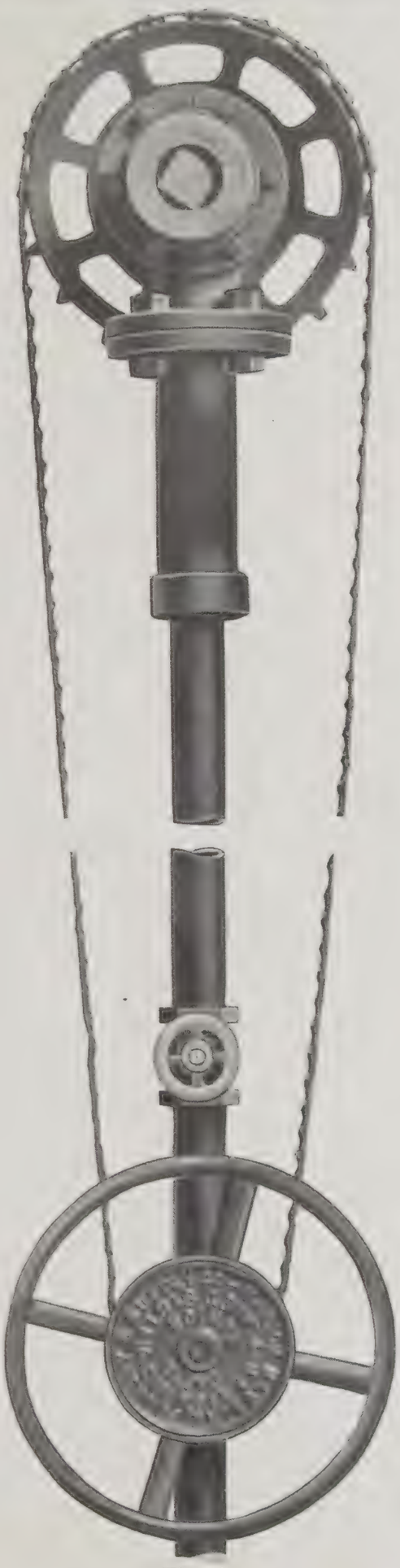


Fig. 4
Reduction Gear Control.

MARION BALANCED HEAD SOOT BLOWER PARTS

NAME OF PART	Type "AB" No. 1½"	No. 2"	Type "A" No. 1½"	No. 2"
Head	14522	14551	14522	14551
Head Flange	14523	14552	14523	14552
Packing Nut—Bronze	14521	14554	14521	14554
Packing Gland, Bronze	14520	14556	14520	14556
Swivel Tube — Bronze	14519	14555	14519	14555
Sprocket Wheel	14524	14557	14524	14557
Wall Box	14525	14558	14525	14558
Offset Bend	14701	14611	14518	14553
Tie Bar				
Adjusting Stud				
Valve	14702	14685		
Valve Stem Block	14689	14689		
Valve Seat	14703	14684		
Valve Lever	14688	14688		
Valve Lever Link	14686	14686		
Valve Spring	14692	14692		
Valve Stem Packing Nut	14637	14687		
Valve Cable				
Cable Clamp	14691	14691		
Turnbuckle	14935	14935		
Operating Lever	14683	14683		
Operating Lever Bracket	14693	14690		
Small Sprocket Wheel	14530	14530	14530	14530
Operating Hand Wheel	14529	14529	14529	14529
Hand Wheel Bracket—Comp.	14535	14535	14535	14535
Cap for Hand Wheel Bracket	14536	14536	14536	14536
Wall Bracket	14680	14680		
Operating Lever Bracket, L.H.	14681	14681		
Operating Lever Bracket, R.H.	14682	14682		
Chain	25	25	25	25
Packing Nut Wrench				

ELEMENTS

No. 2200 Orange Color
Special Alloy—Red Color
Ex. Heavy Steel—Black Color.

STANDARD TUBE CLAMPS

3" x 2"	14769	14769	14769	14769
3¼" x 1½"	14546		14546	
3¼" x 2"		14769		14769
3½" x 2"	14635	14635	14635	14635
4" x 2"	14531	14531	14531	14531
3½" x 2" Hook Type	14634	14634	14634	14634
3½" x 2" Cap	14633	14633	14633	14633
4" x 2" Hook Type	14515	14515	14515	14515
4" x 2" Cap	5508	5508	5508	5508
2" x 2" Superheater	14743	14743	14743	14743

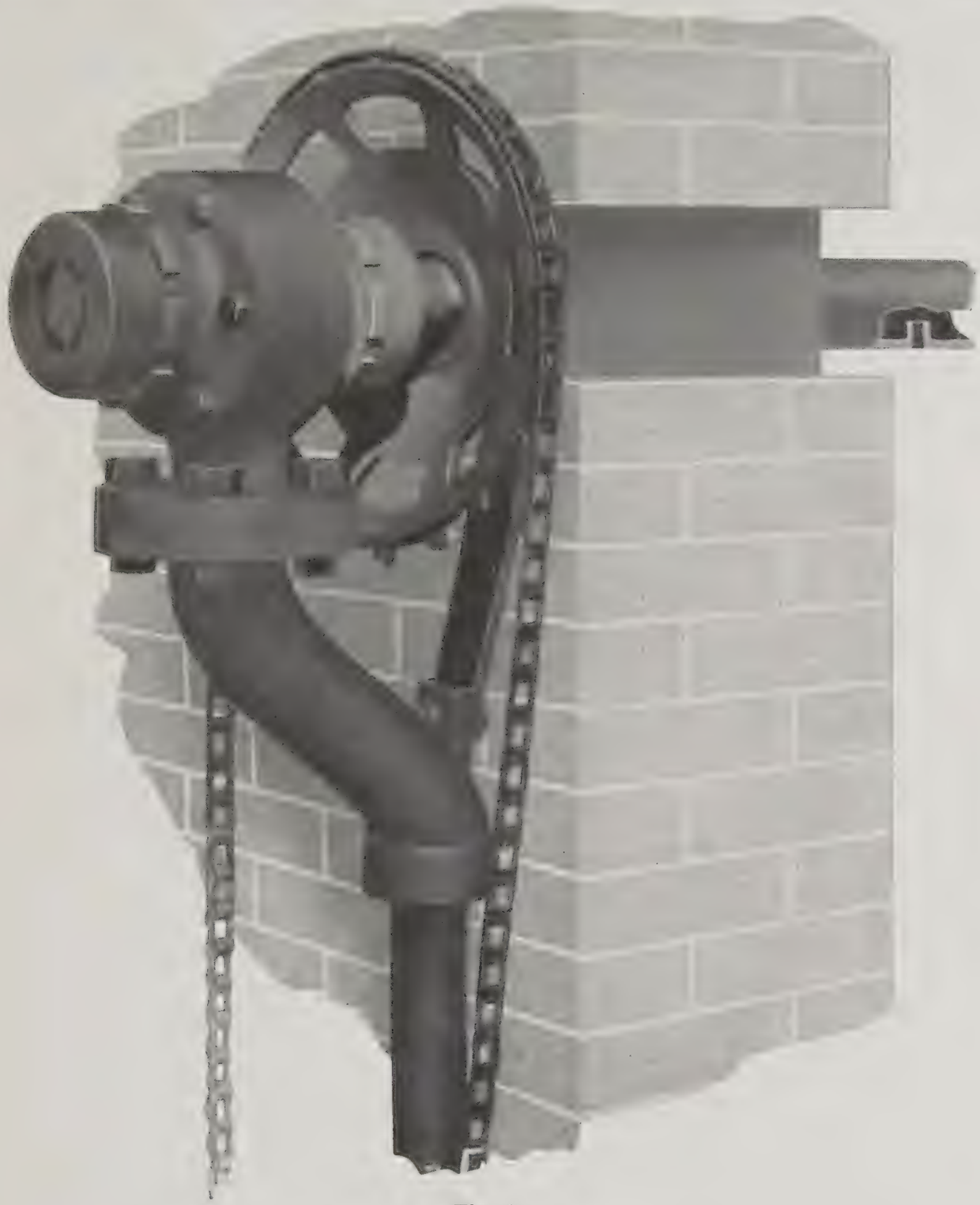


Fig. 6
Marion Type "A" Soot Blower

MARION TYPE "A" SOOT BLOWER

Balanced Head

The Marion Type "A" Balanced Head Soot Blower is designed to clean the boiler tubes of soot, without in any way interfering with the usual operation of the boiler plant.

The steam for cleaning is furnished from horizontal header from which vertical riser pipes conduct steam through offset bend into each blower head and blower element.

Blower elements are equipped with Internal Welded Venturi Nozzles, so

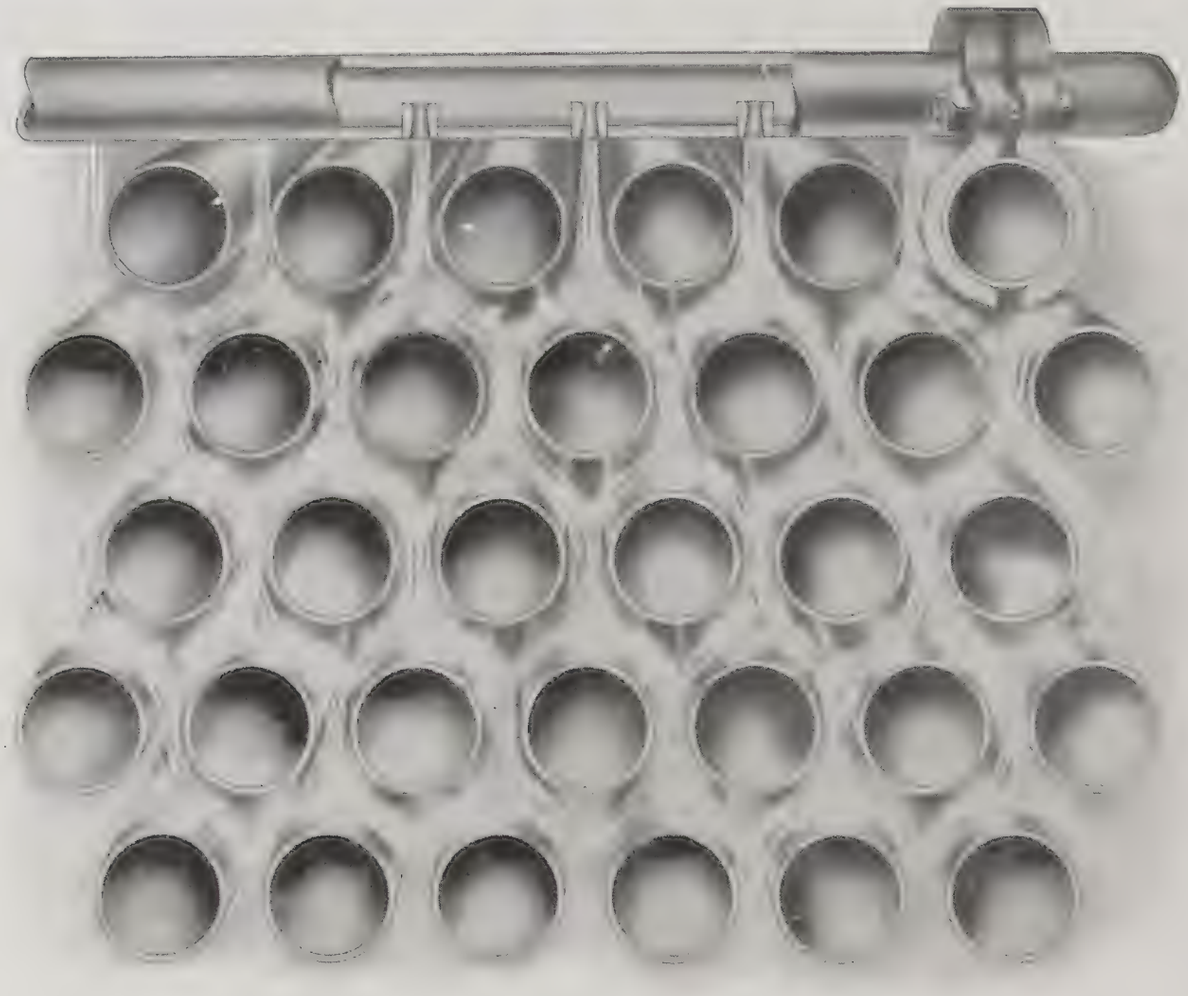


Fig. 7

Illustrating Action of Steam Through Boiler Tubes.

spaced that the steam jets strike directly between the first row or bank of tubes.

The elements are operated by reduction gear control, which insures steady, uniform rotation, most suitable to efficient cleaning.

Elements for high-temperature passes are made of Marion Hi-Temperature Special Alloy to withstand heat up to 2200 degrees Fahrenheit without oxidation. Elements for the other passes withstand temperatures up to 1500 degrees Fahrenheit without oxidation.

Type "A" Soot Blowers have these advantages:

1. Balanced Head—eliminating end thrust and severe squeezing of packing and strain on the gland.

2. Reduction Gear Control—acknowledged by engineers as the peak of efficiency in rotating blower elements.

3. Internal Welded Venturi Nozzles—they do not come loose from oxidation and drop out.

4. Marion Hi-Temperature Special Alloy elements to withstand high temperatures. Marion Type "A" Soot Blower is applicable to practically every type of water tube boiler, super-heater and economizer.

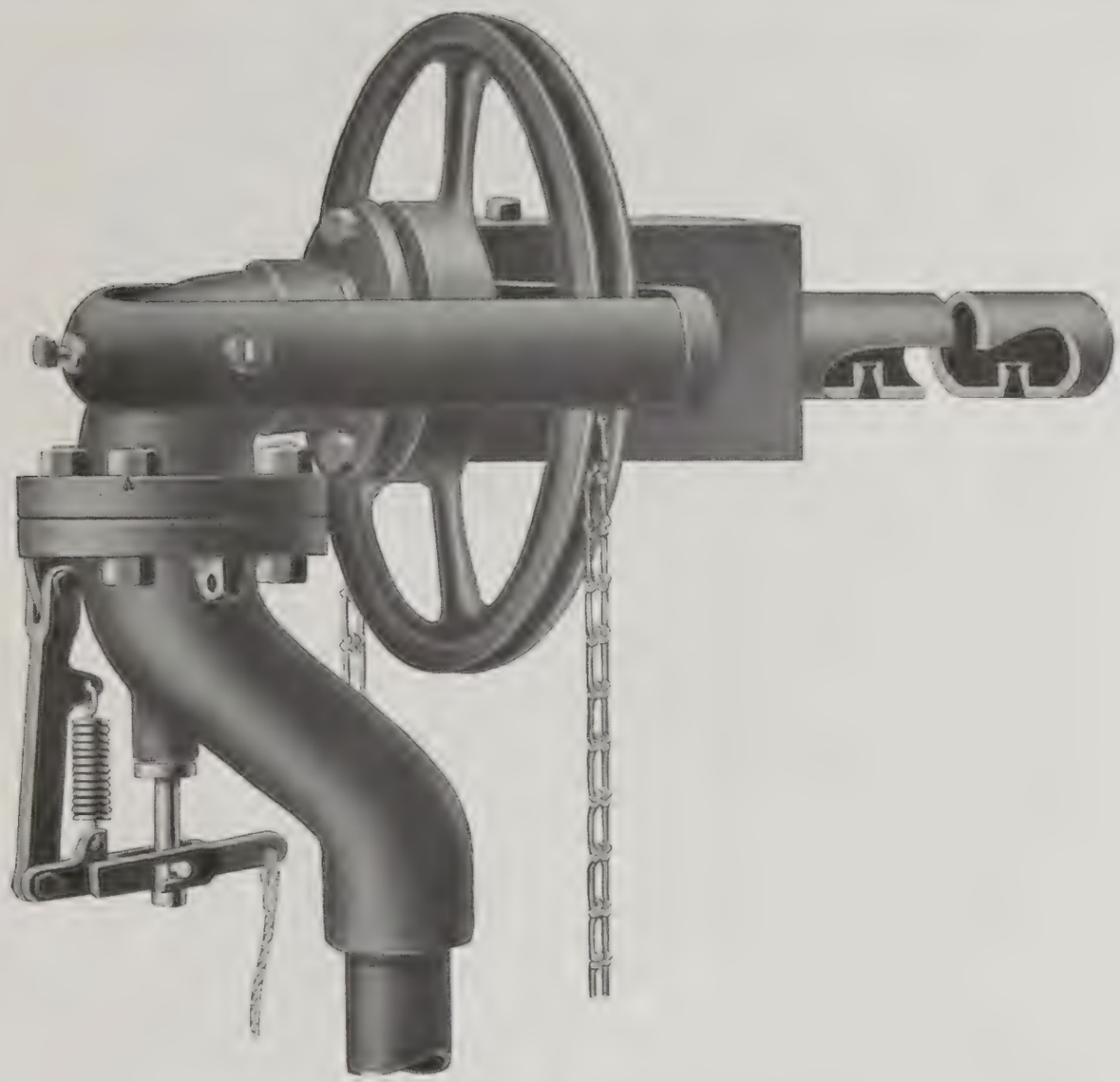


Fig. 8

View of Marion Type "EB" (Special) Soot Blower

MARION TYPE "EB" (SPECIAL) SOOT BLOWER

Valve-at-Head, Independently Operated.

Marion Type "EB" Soot Blower is for the water tube boilers and is applicable to all types of these boilers. This is a yoke type blower, the yoke firmly anchoring the gooseneck to wall. Stops and indicator on sheave wheel permit the operator to regulate blowing arc, preventing steam jets from striking against baffles, and brick furnace walls to loosen mortar.

The valve-at-head enables the engineer to utilize the full blowing pressure of steam throughout the entire blowing period, consequently there are no dirty corners and no waste of steam.

The elements are equipped with Internal Welded Venturi type of nozzle and are rotated by sprocket chain within easy reach of engineer.

The Valve seat is either phosphor bronze or monel metal and is renewable or easily reground.

Fig. 9
View of Marion Type "E" Soot Blower

MARION (SPECIAL) TYPE "E" SOOT BLOWER

The illustration on this page shows the Marion Type "E" Special Soot Blower applied to a water tube boiler and also shows the bracket and method of clamping blower element to water tube.

This type of soot blower is adaptable to all types of water tube boilers, superheaters and economizers. The blower head is firmly anchored to the wall box; which in turn is firmly bricked into the furnace wall giving substantial support to the whole unit. The wall box has boss on either side which, when bricked into the wall, holds it rigidly and securely in place. The yoke fits around the goose neck and is fastened to the wall box.

This method of anchoring the head securely to the wall box by means of a yoke is a marked improvement over other soot blowers of this type.

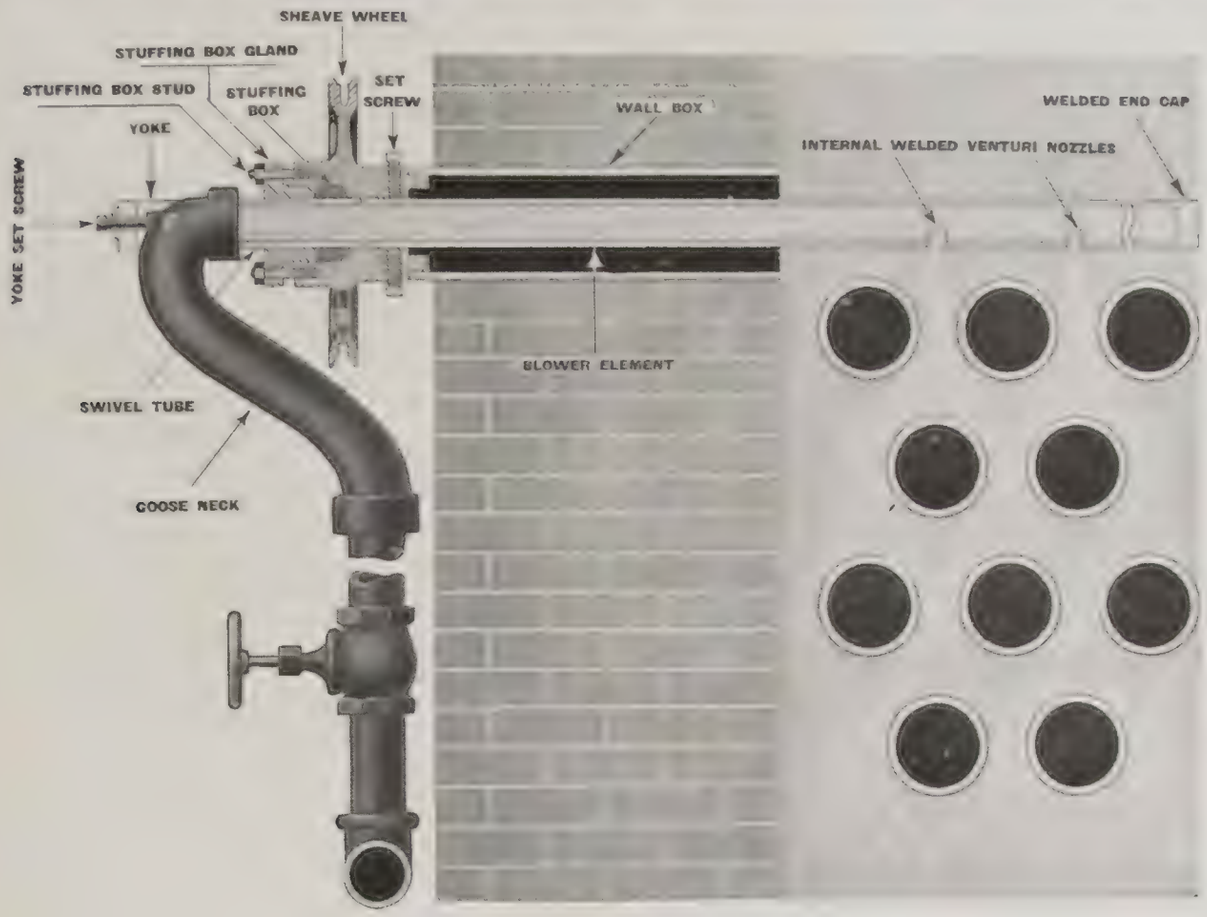


Fig. 10
Cross-section Marion Type "E" Soot Blower.

It prevents shifting, due to end thrust caused by the steam pressure in the goose neck and the expansion and contraction in the soot blower element is carried to the blind end of the pipe. In the steam supply line it is carried to the horizontal headers. There is sufficient play in the bearings carrying the elements to allow for all movement of the boiler tubes or boiler wall. Stops are on the sheave wheel which permit the operator to so rotate the elements that the steam jets will not strike against the headers or brick wall. The sheave wheel and element are rotated by means of a chain which is of any length to best suit local conditions.

The blowing elements are equipped with the well known venturi type of nozzle, internally welded. This type of nozzle does not come loose from oxidation and fall out as with many types of screwed in nozzles. The end cap is also welded and will not come loose.

The nozzles are so spaced in the element that the blast of steam strikes directly between the first row of tubes. This method has been highly satisfactory with leading mechanical and operating engineers.

PARTS LIST

Name of Part	Type "EB" 1½"	Type "EB" 2"	"Type E" 1½"	"Type E" 2"
Wall Box	5501	5501	5501	5501
Yoke	14825	14825	14825	14825
Sheave Wheel	14823	14828	14823	14828
Packing Gland	14858	14827	14858	14827
Stops	5505	5505	5505	5505
Swivel Tube, Bronze	5506	14826	5506	14826
Offset Bend "E"			14824	14824
Hand Elbow, "EB"	14830	14829		
Offset Bend, "EB"	14701	14611		
Valve	14702	14685		
Valve Stem Block	14689	14689		
Valve Seat	14703	14684		
Valve Lever	14688	14688		
Valve Lever Link	14686	14686		

Name of Part	Type "EB" 1½"	Type "EB" 2"	"Type E" 1½"	"Type E" 2"
Valve Spring	14692	14692		
Valve Stem Packing Nut	14687	14687		
Valve Cable				
Cable Clamp	14691	14691		
Turnbuckle	14935	14935		
Operating Lever	14683	14683		
Operating Lever Bracket	14693	14690		
Chain Guide	14869	14869	14869	14869
Chain	No. 0	No. 0	No. 0	No. 0
Connecting Link	14872	14872	14872	14872

No. 2200—Orange color Special Alloy—Red color.
Extra heavy steel—Black colors.
Clamps same as Type "A."

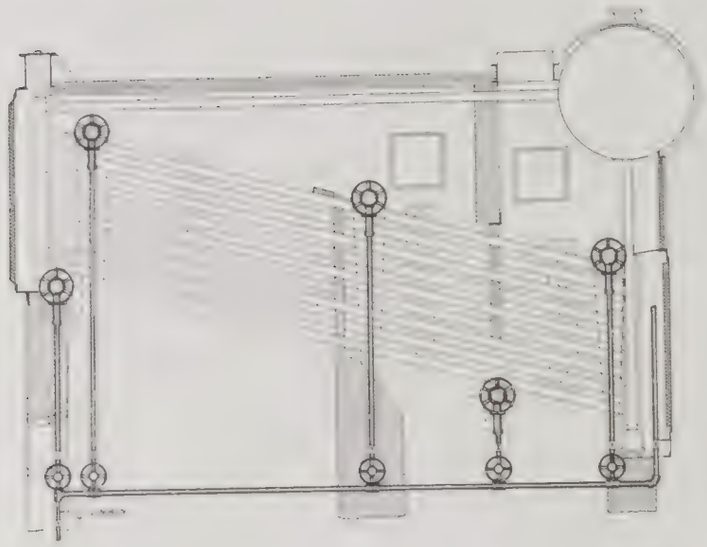


Fig. 11

Kingsford-Webster

Marion five unit installation on three pass vertical baffled horizontal boiler.

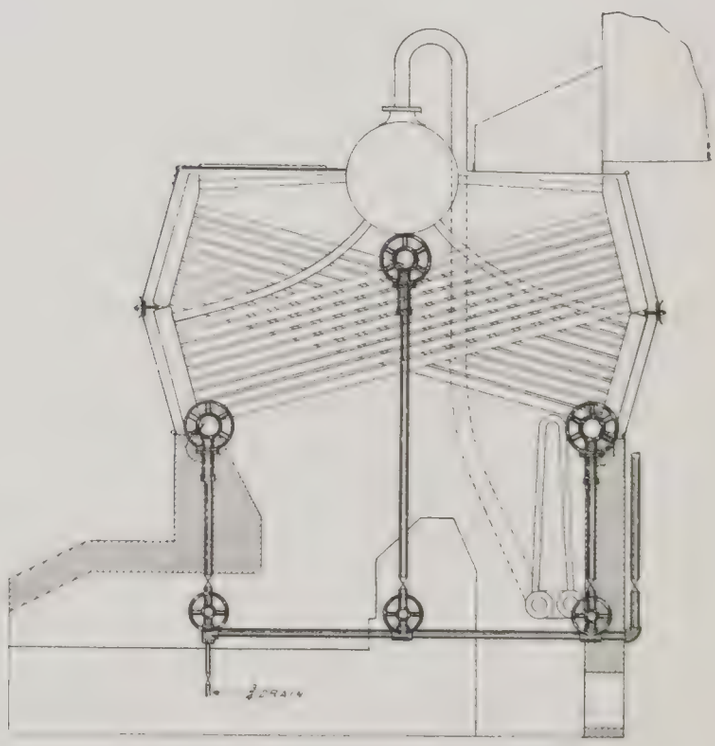


Fig. 12

Paige Burton & Worthington

Marion three-unit installation on Paige-Burton and Worthington Boilers.

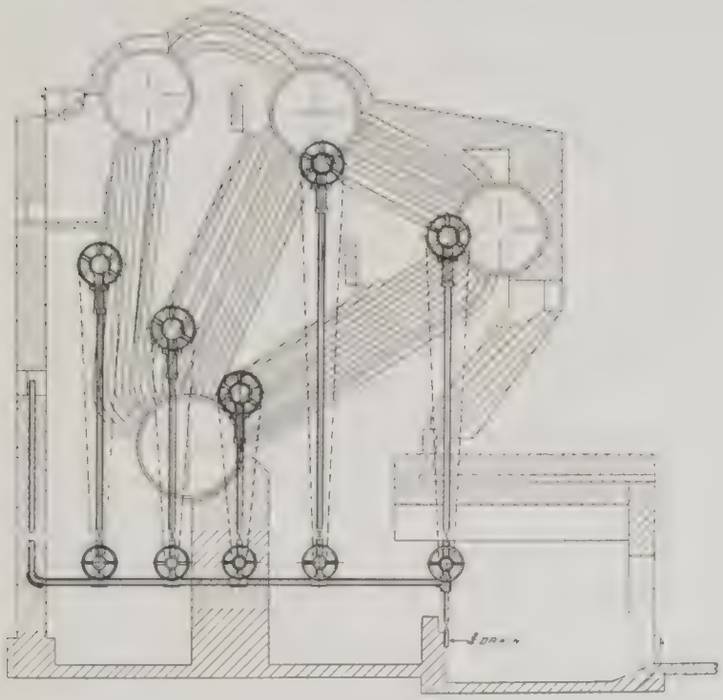


Fig. 13

Connelly

Marion five-unit installation as applied to a three-pass Connelly Boiler.

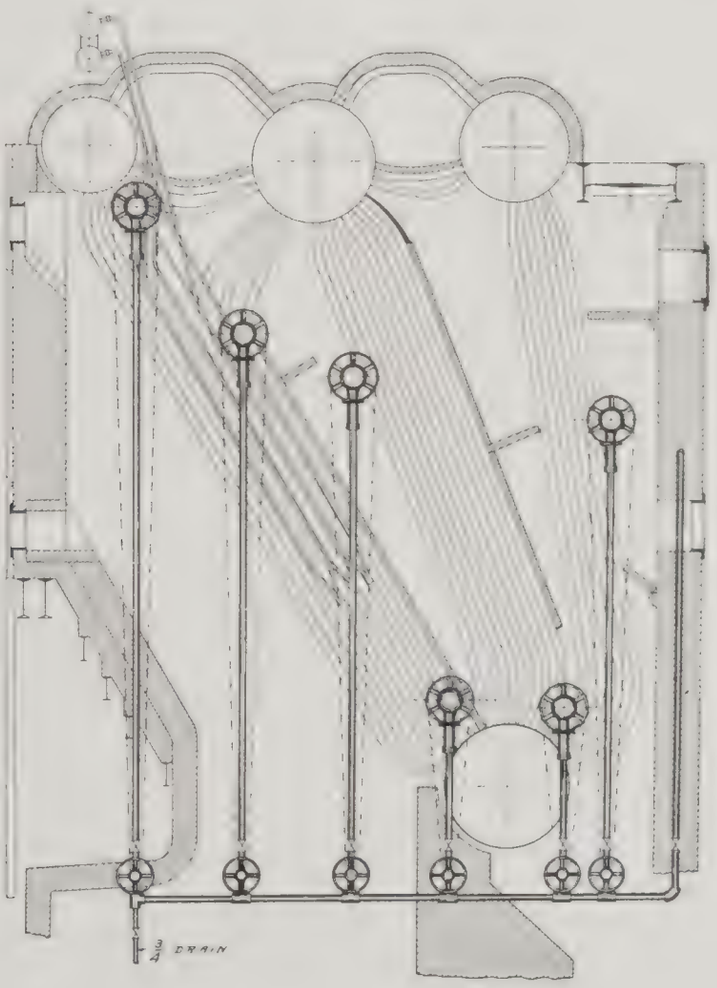


Fig. 14

Heine "V" Type

Marion six-unit installation on three-pass vertical boiler equipped with superheater.

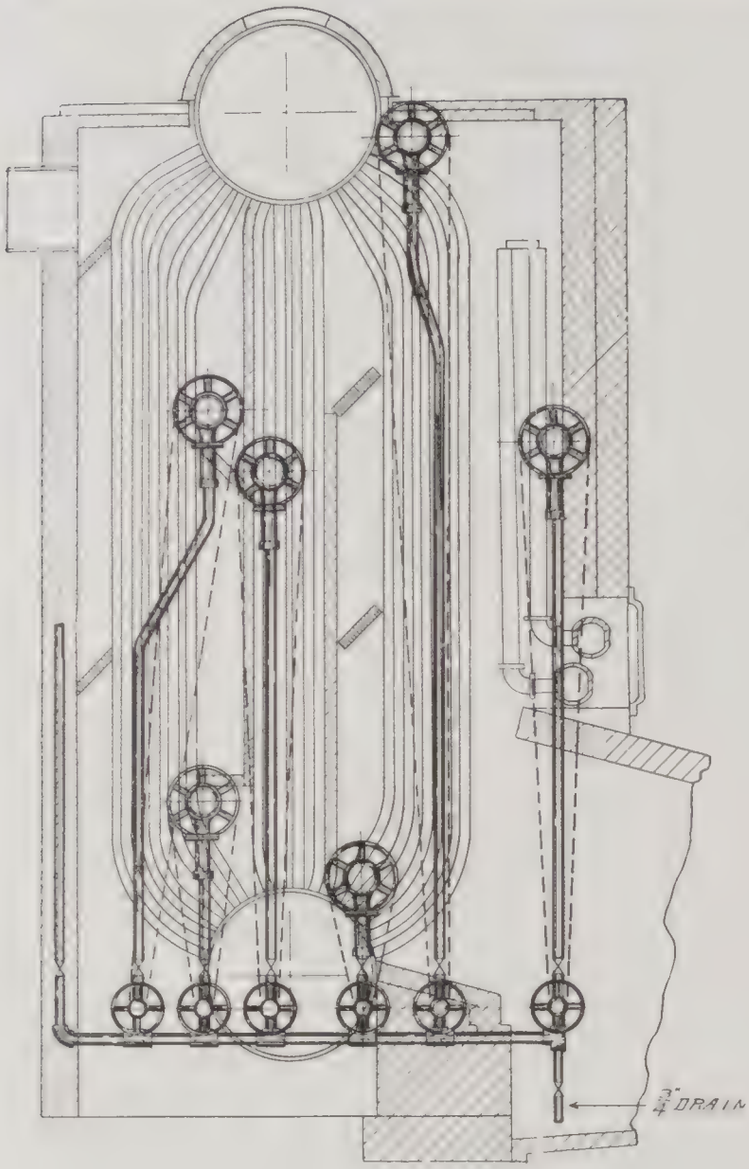


Fig. 15

Ladd or Erie City

Marion six-unit installation on Ladd or Erie City Boiler equipped with super-heater.

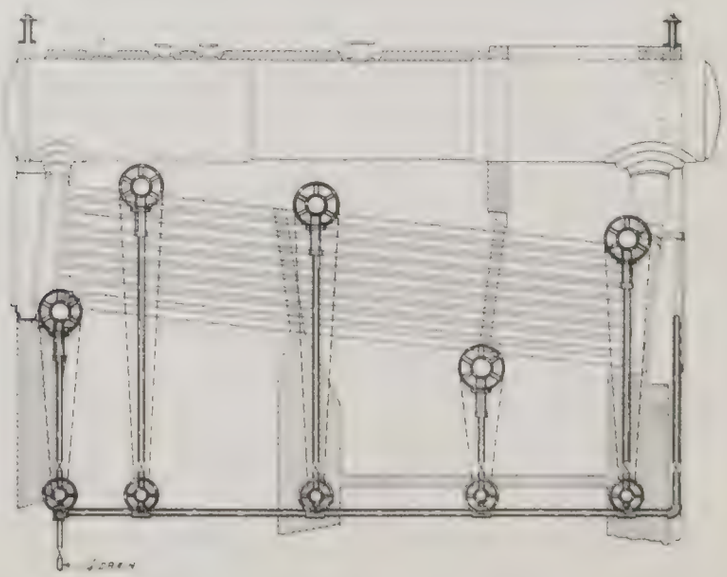


Fig. 16

Union Iron Works

Marion five-unit installation on three-pass vertical baffled Union Iron Works Boiler.

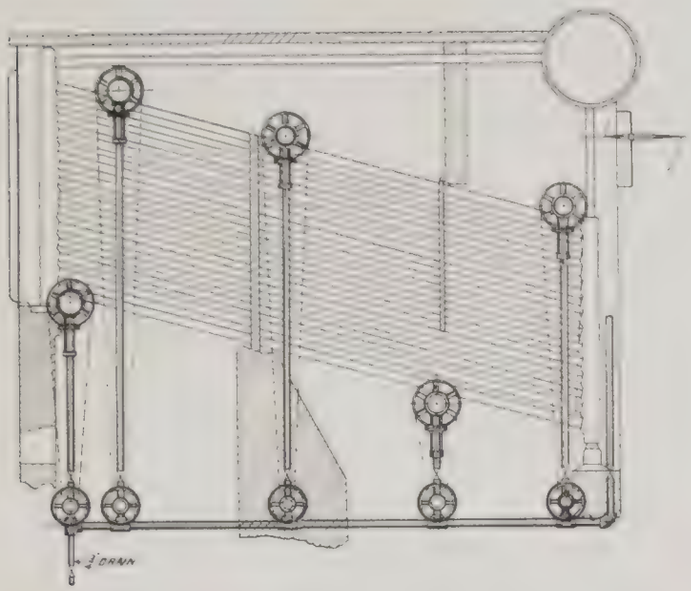


Fig. 17

Babcock & Wilcox

Marion five-unit installation on B. & W. Boiler.

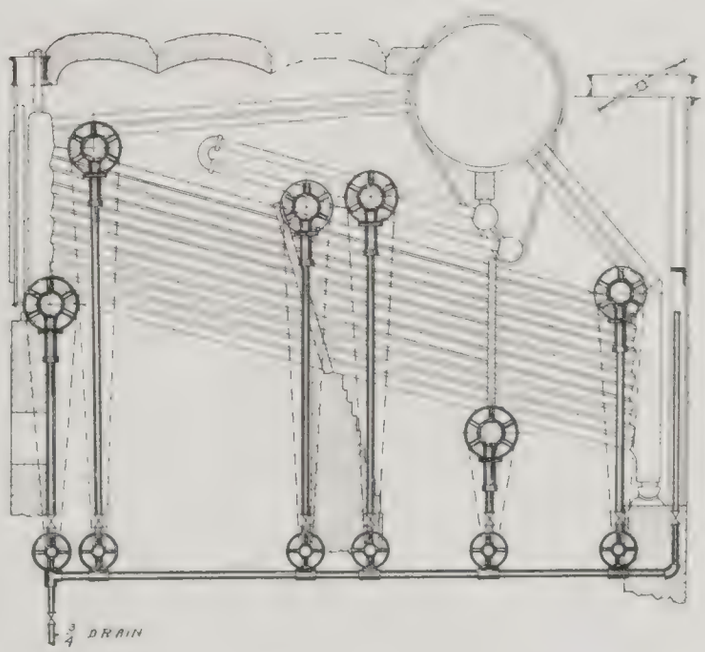


Fig. 18

Springfield

Marion six-unit installation on three-pass vertical baffled boiler with superheater.

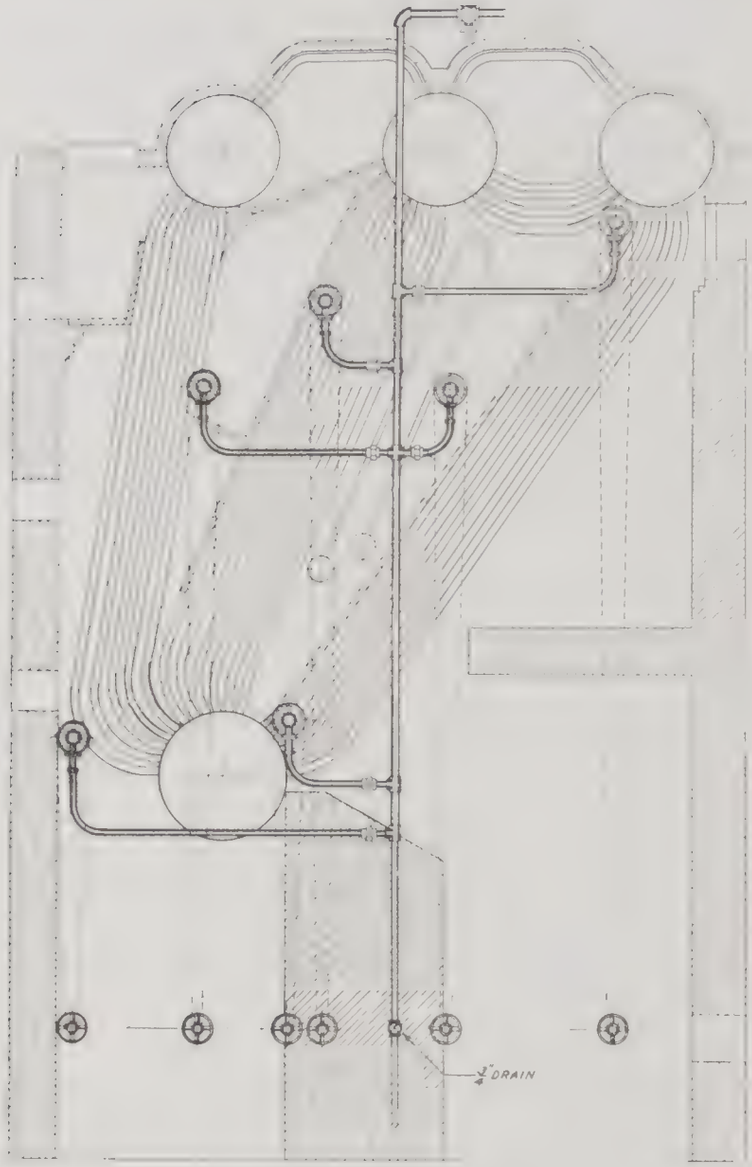


Fig. 19

Sterling

Marion Six-Unit Sterling Installation on a high set Sterling Boiler.

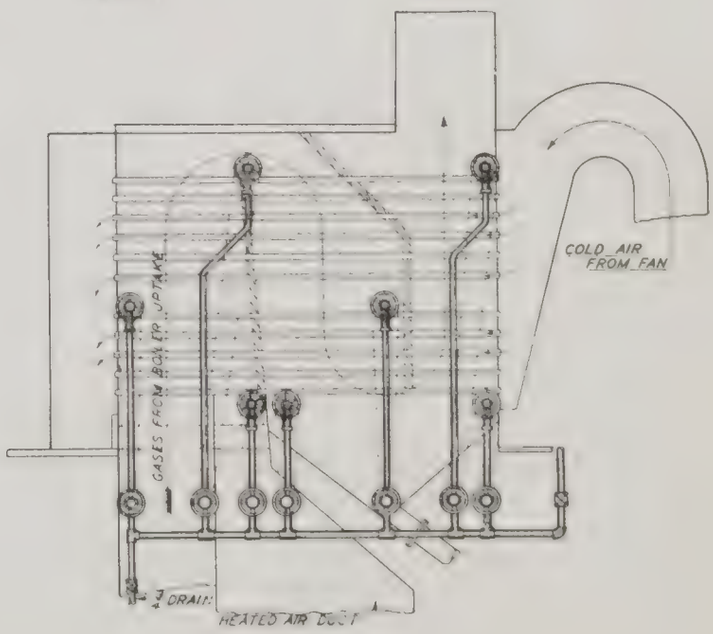


Fig. 20

Air Heater

Marion Seven-Unit Installation on an Air Heater.

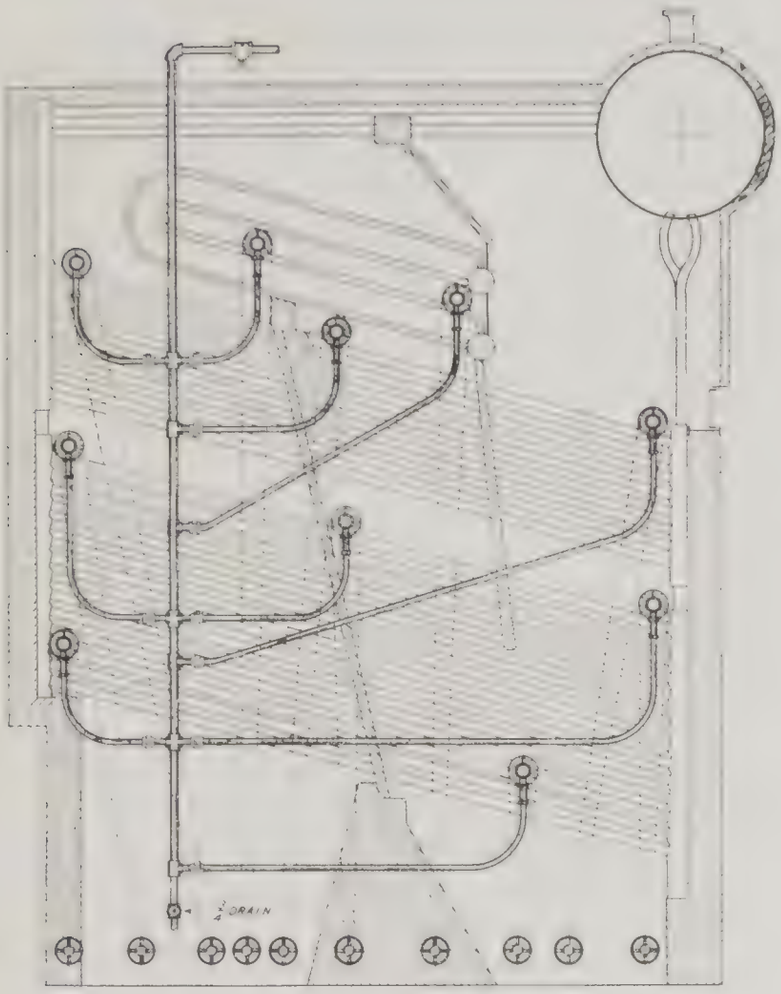


Fig. 21

Babcox and Wilcox

Marion Ten-Unit Installation on a high set Double Deck B.&W. Boiler With Superheater.

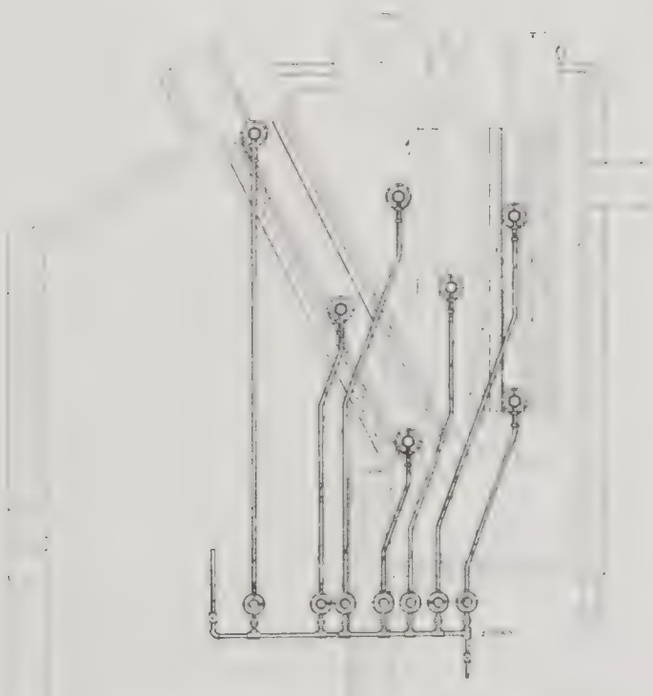


Fig. 22

Bigelow-Hornsby

Marion Seven-Unit Installation on a Bigelow-Hornsby Boiler.

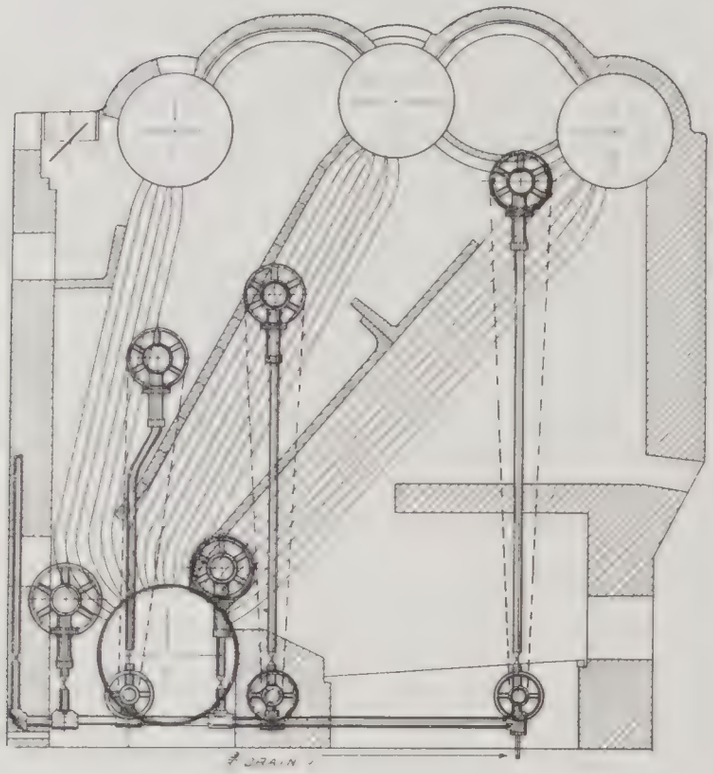


Fig. 23

Stirling

Marion five-unit installation on three-pass Stirling Boiler without Superheater.

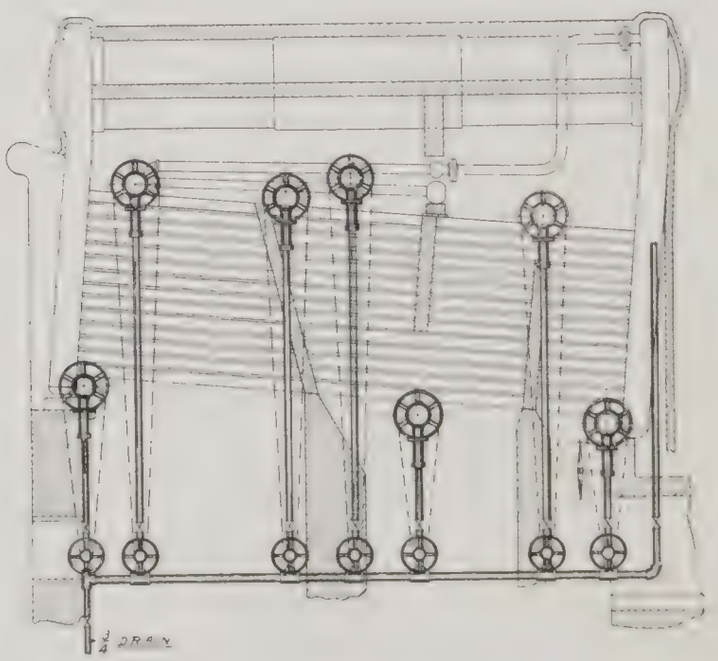


Fig. 24

Edgemoor

Marion seven-unit installation on four-pass horizontal boiler equipped with super-heater.

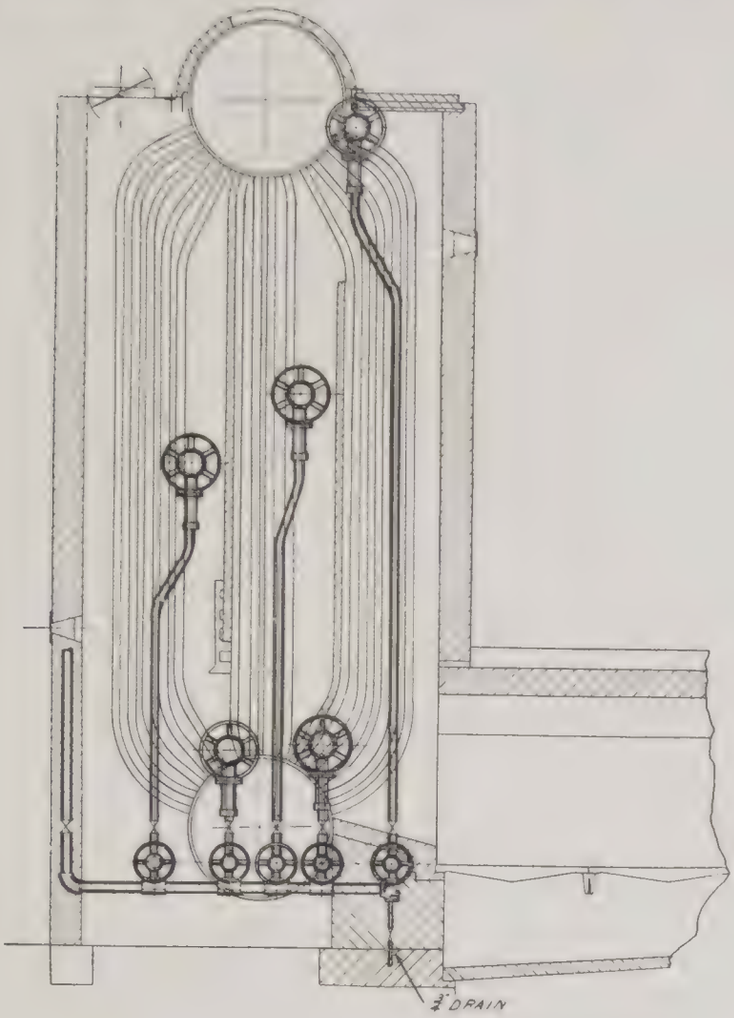


Fig. 25

Erie City Vertical

Marion five-unit installation on three-pass Erie City Vertical Boiler.

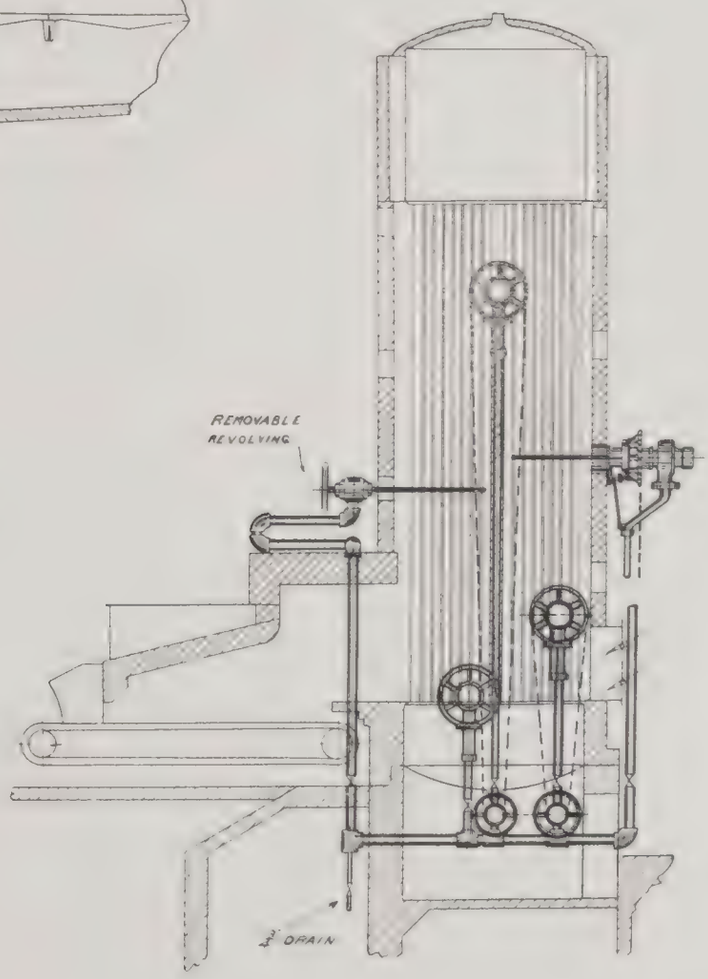


Fig. 26

Wickes

Marion five unit installation on Wickes Boiler showing two removable revolving elements.

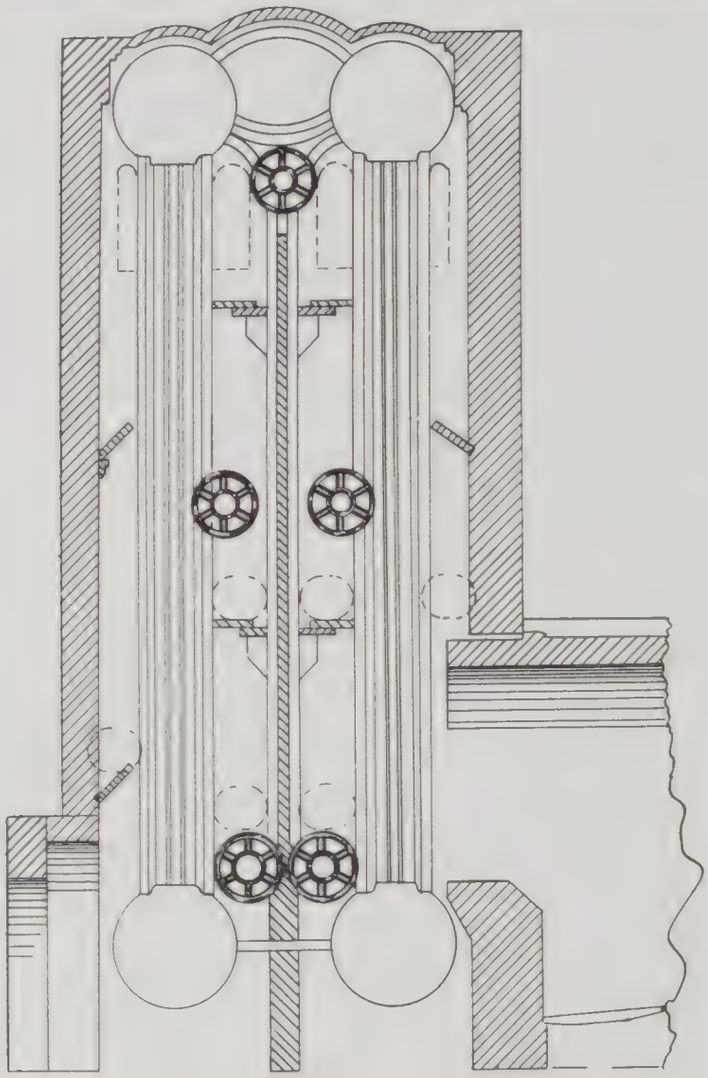


Fig. 27

Rust Waste Heat Boiler

Marion five-unit installation on a two-pass Rust Waste Heat Boiler.

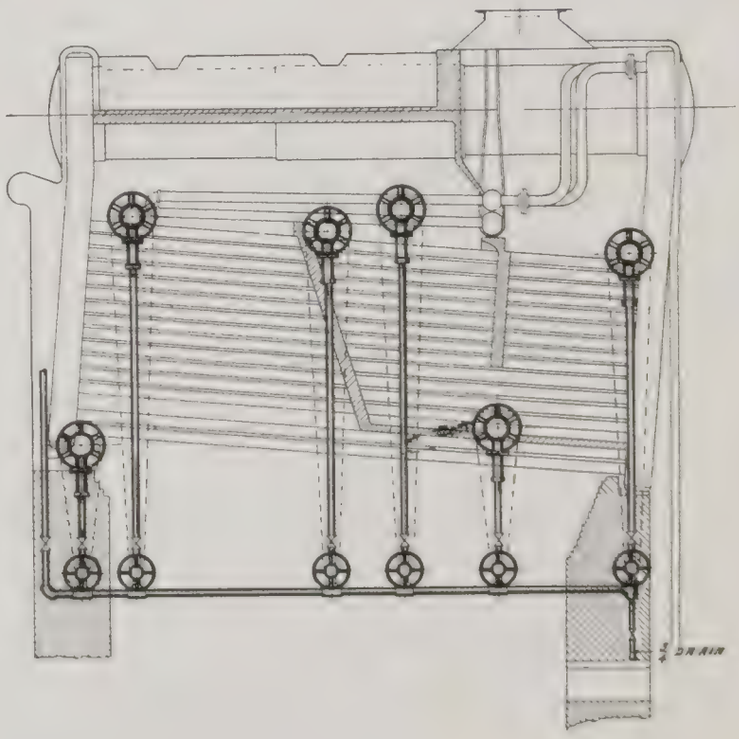


Fig. 28

Horizontal Water Tube Boiler with Combination Baffle and Superheater.

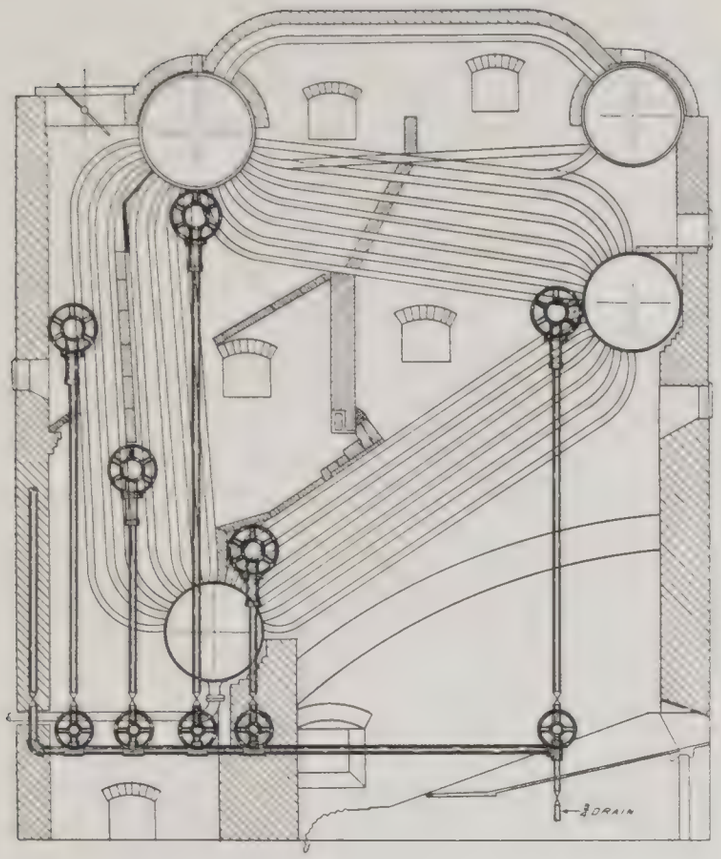


Fig. 29

Kidwell

Marion five-unit installation on three-pass Kidwell Boiler without super-heater of the above type.

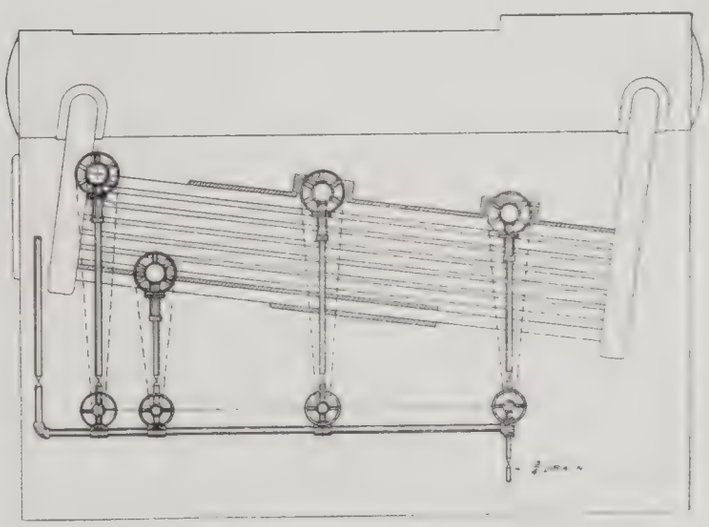


Fig. 30

Keeler-Heine-Kroeschell-Oil City

Marion four-unit installation on one pass horizontally baffled Boiler.

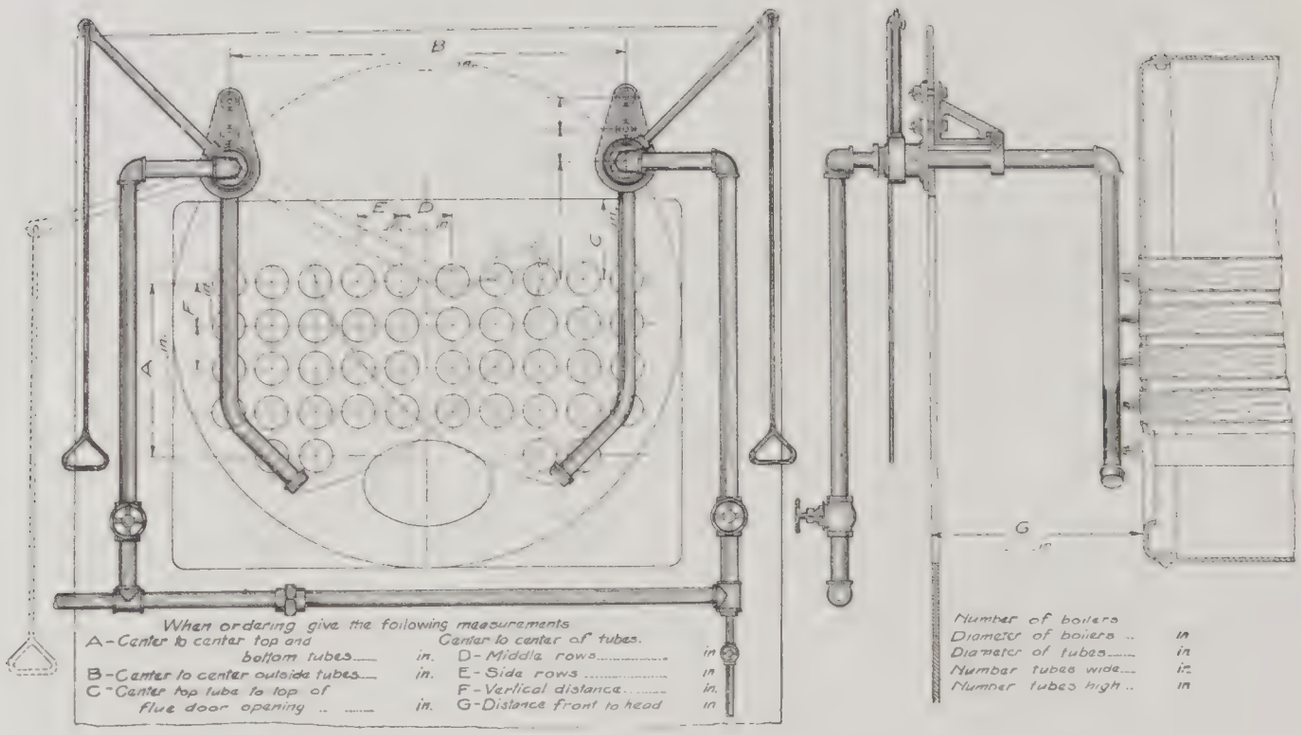

When ordering give the following measurements
A-Center to center top and bottom tubes ..... in.
B-Center to center outside tubes ..... in.
C-Center top tube to top of flue door opening ..... in.
Center to center of tubes.
D-Middle rows ..... in
E-Side rows ..... in
F-Vertical distance ..... in.
G-Distance front to head ..... in
Number of boilers
Diameter of boilers ..... in
Diameter of tubes ..... in
Number tubes wide ..... in
Number tubes high ..... in

Fig. 31
Marion Duplex Soot Blower.

SOOT IN FIRE TUBE BOILERS

Conditions are different in fire tube than in water tube boilers and the flow of the hot gases through the tubes gives the gases less time to give up the heat than in water tube types, which has a longer path through the tube space, giving the hot gases more time. For this reason the surfaces must be clean, if the temperature of the gases is reduced to the lowest point.

The passage of hot gas through a dirty flue is just the same as passing steam through a well covered steam pipe. Very little heat is lost from the hot gases. The soot insulation on the inside of the flue is just as effective in preventing the passage of heat from the hot gases as the pipe covering is in retaining the heat of the steam in the steam pipe.

Not only does the soot accumulations in the flue retard the passage of heat to the water, but also retards the velocity of hot gases through the tubes, thus, cutting down the amount of heat available in any one flue; as the thickness of the soot increases, the volume of gas decreases, making a corresponding reduction in the capacity of the boiler. Soot will partially close the flue in a comparatively short time and to that extent render it useless.

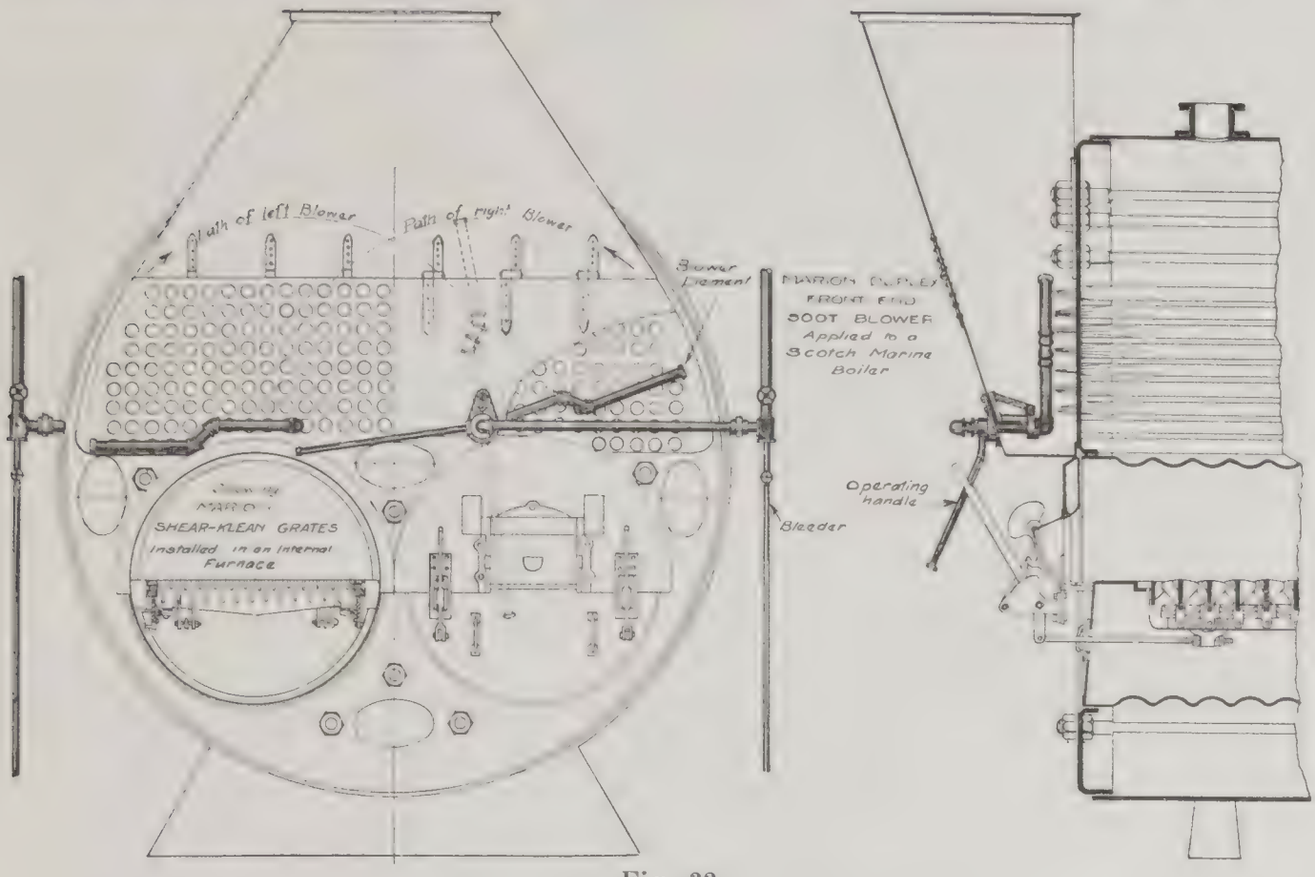

Path of left Blower
Path of right Blower
Blower Element
MARION DUPLEX FRONT END SOOT BLOWER Applied to a Scotch Marine Boiler
Operating handle
Bleeder
SHEAR-KLEAN GRATES
installed in an Internal Furnace

Fig. 32

Marion Duplex Soot Blower as installed on Scotch Marine Boiler.

MARION DUPLEX SOOT BLOWER FOR H.T.R. BOILER

The Marion Duplex Soot Blower is especially adapted to the horizontal return tubular boiler. It consists of two units mounted on the boiler front just over the tube area in such a position that the **flue doors can be opened** at any time **without disconnecting any part of the piping.** All piping is so arranged that no condensation reaches the blower.

The unit on the right (Fig. 31) is shown in the position it occupies when not in use. The left unit is shown in normal position and also a phantom view showing its position after it has been moved across the flue space. Note how perfectly all tubes are reached.

A lever and handle make the blower easy to operate, requiring very little effort. The tubes can be cleaned frequently and quickly.

The Marion Duplex Soot Blower is one of the most efficient front end soot blowers for fire tube boilers. The blower arms are located in the uptake and are away from the heat and at the same time are permanently attached to the boiler front and are not interfered with, or nozzles drawn out of alignment by the sagging of boiler doors. These arms also cover the flue space only and do not direct the steam against flue sheet. For Scotch Marine Boilers—Blowers of the same type are manufactured by us for installation on Scotch Marine Boilers.

THE MARION DUPLEX FRONT END SOOT BLOWER

In Fig. 32 we have the Marion Duplex Front End Steam Soot Blower installed on a Scotch Marine Boiler. This blower consists of two units; one on either side and mounted permanently to the smoke box. The right side shows parts of the door removed and the distributors moving over the tube space. The left side shows the door and outside element removed and the distributor lying at the bottom of the smoke box. Every boiler tube gets one or more jets of steam directly through it so all are absolutely cleaned. The blower is rotated by a hand lever attached to the outside element.

The distributor is of the same material as the Marion Duplex Distributor and fitted with INTERNAL NOZZLES IN THE SAME WAY. THEY ARE FULLY PROTECTED FROM THE HEAT.

PARTS LIST

Name of Part	1½"
Head	5578
Swivel Tube—Brass	5579
Packing Nuts	5581
Operating Handle Collar	5582
Operating Handle	5586
Pull Rods	5593

Name of Part	1½"
Bracket — Standard	5589
Bracket — 4"	5591
Bracket — 2½"	5584
Bracket Caps	5590
Right Hand Element	
Left Hand Element	

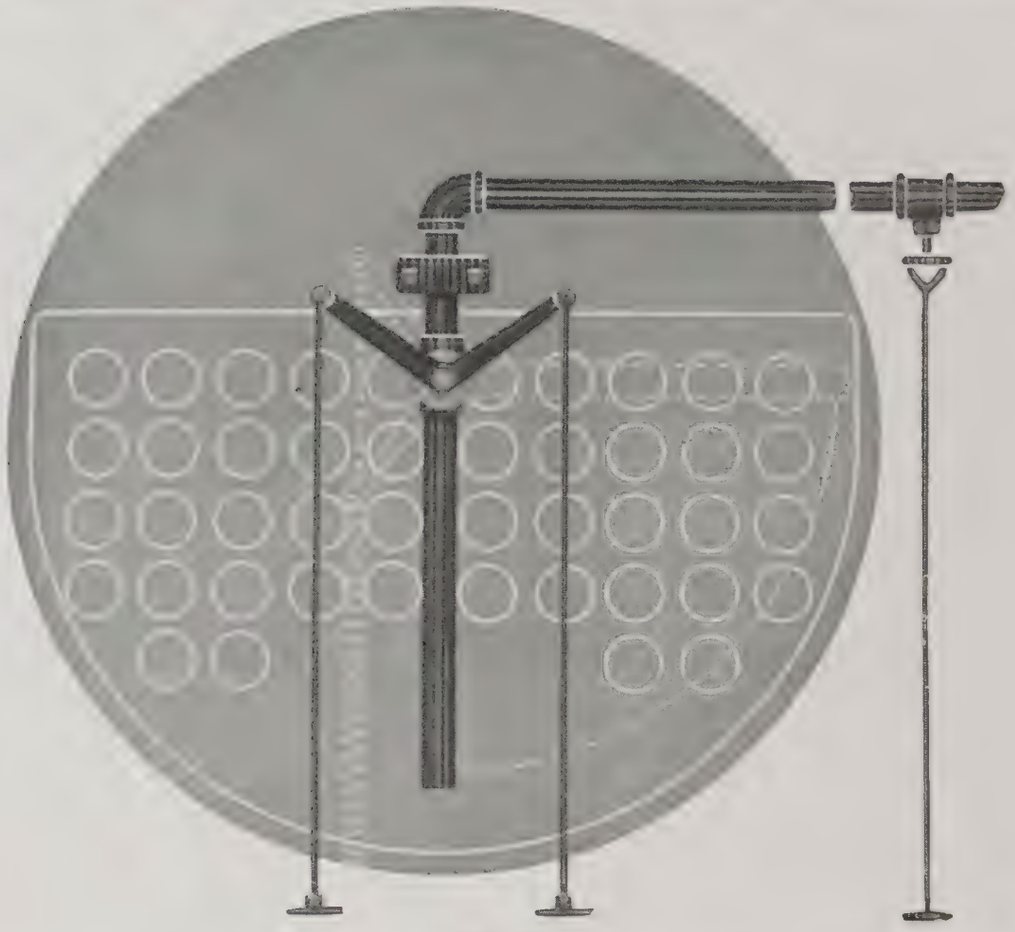


Fig. 33
Marion Type "C" Soot Blower—Front View.

MARION TYPE "C" SOOT BLOWERS FOR H.R.T. BOILERS

The Marion Type "C" Mechanical Soot Blower for H. R. T. boilers thoroughly cleans the tubes of soot, fine ash and cinders, by simply turning on the blast of dry steam and rotating the blower arm. There is little if any expense for upkeep and the amount of coal saved pays for installation in a few weeks' time. It can be installed without difficulty and requires no alteration or changes in the boiler setting.

EQUIPMENT

Type "C" Tube Cleaner equipment consists of blowing head, blowing arm, valve extension operating lever and supporting bracket. The blowing head is similar to balanced head for water tube boilers. The blower arm is made with well known Venturi type internal welded nozzles, so spaced that the powerful blast of dry steam strikes directly into the tubes as the blower arm is rotated.

EASY TO OPERATE

Open the drip valve, turn the steam valve, pull the operating lever two or three minutes and the boiler tubes are throughly cleaned of soot, fine ash and cinders. The steam pressure immediately increases and less coal is burned.

The operating levers are outside of the smoke box doors and the connecting rods are in easy reach of the engineer. The cleaner in no way interferes with the opening of smoke box doors as operating lever can be easily removed at any time.

OUR GUARANTEE

We guarantee the Marion Type "C" Soot Blower if installed and used as we direct, will clean the boiler tubes of the objectionable soot and fine ash and will repay its cost in less than one year's time, in the saving of coal. In addition it will eliminate the hard disagreeable work connected with the old hand lance methods—it will do away with the steam hose, protect the tubes from cold drafts, increase the steam pressure, with less coal and increase the efficiency of the boiler room. We are so convinced that the performance of Type "C" Soot Blower will be satisfactory, that we accept orders for a 30-Day Free Trial. If it is not all we claim for this blower, it may be returned to us at the end of 30 days trial and full credit for the purchase price will be made.

MARION TYPE "C" BLOWER

Name of Part	Part No. 1½"
Head	14621
Swivel Tube	14623
Swivel Tube Washer	14626
Packing Gland	14520
Packing Nut	14521
Operating Lever	14624
Operating Lever Shaft	14627
Pull Rods	14628
Bracket—4"	14619
Bracket—6"	14625
Bracket—9"	14618
Bracket—12"	14943
Bracket Cap	14536
Wrench	14683
Valve Rod	14630
Element	

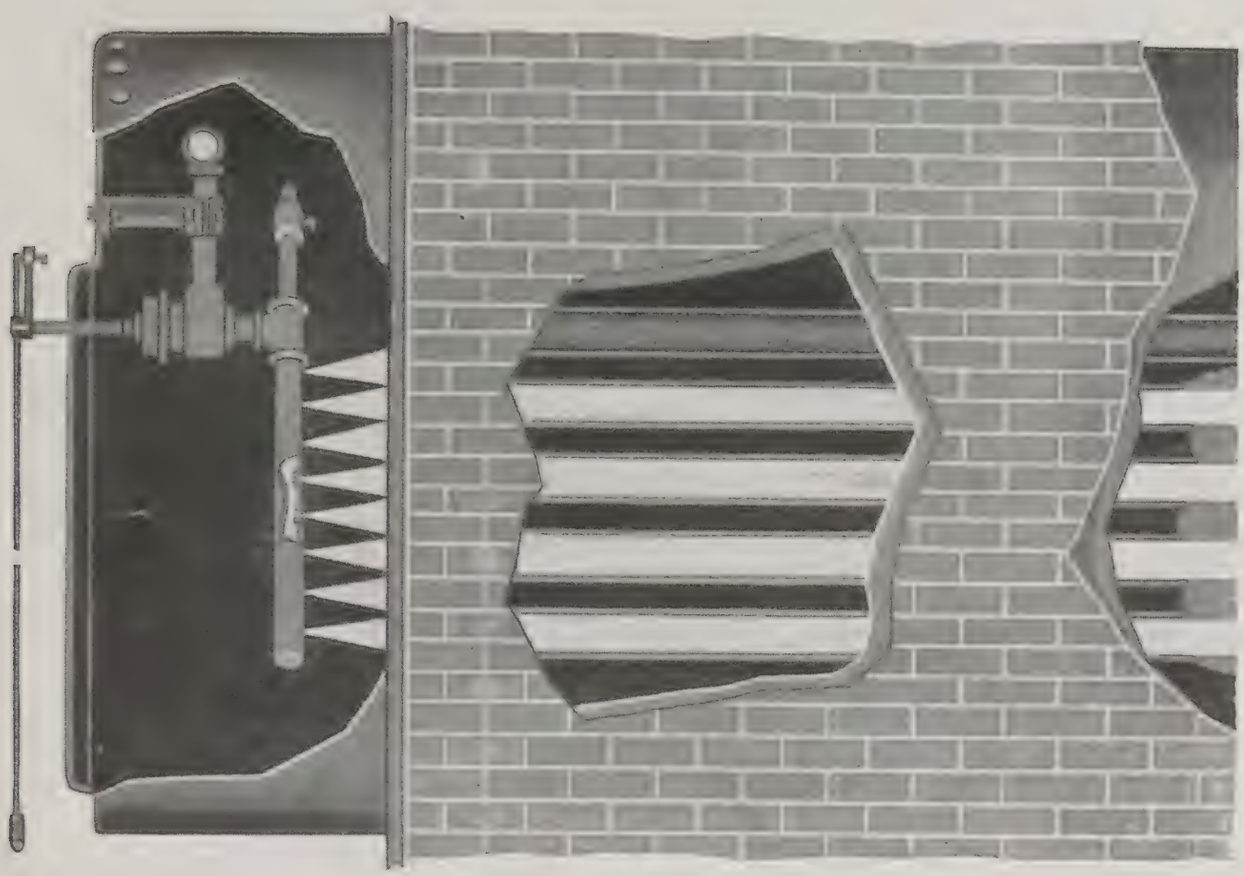


Fig. 34

Marion Type "C" Soot Blower—Side View

IMPORTANT

When Ordering Do Not Fail to Give Specifications Below and Furnish Sketch Showing Tube Arrangement

Diameter boiler.....in. Width of smoke box.....in. Distance top row of tubes to top of flue door.....in. Center to center tubes, side row.....in. Center to center tubes, vertical distance.....in. Total number tubes wide..... Total number tubes high..... Total number of tubes..... Tube diameter..... in. Location of water column..... Distance manhole yoke extends from boiler head.....in. Type of boiler front.....flush..... Overhanging.

Name.....

Street.....

City.....

State.....

Fig. 36

Marion Rotary Soot Blower on Scotch Marine Boiler.

Fig. 36 shows the Marion Rotary Soot Blower. It is a single jet type that delivers a small volume of steam at high velocity through the flues. This drives out all loose ash and soot.

The steam nozzle contains a number of steam ports having DIFFERENT ANGLES. These ports are opened one at a time. The whole nozzle is rotated upon its axis, which allows each port to successfullv direct a steam jet against a fixed section of the flue area. The nozzle is made of a special mixture of cast iron which stands tne high temperature.

The blower is mounted on the rear wall of the combustion chamber as shown in Fig. 36, the nozzle setting in a pocket formed by the deep projecting frame set in the brick. In this way it is not subject to the direct heat from the hot gases.

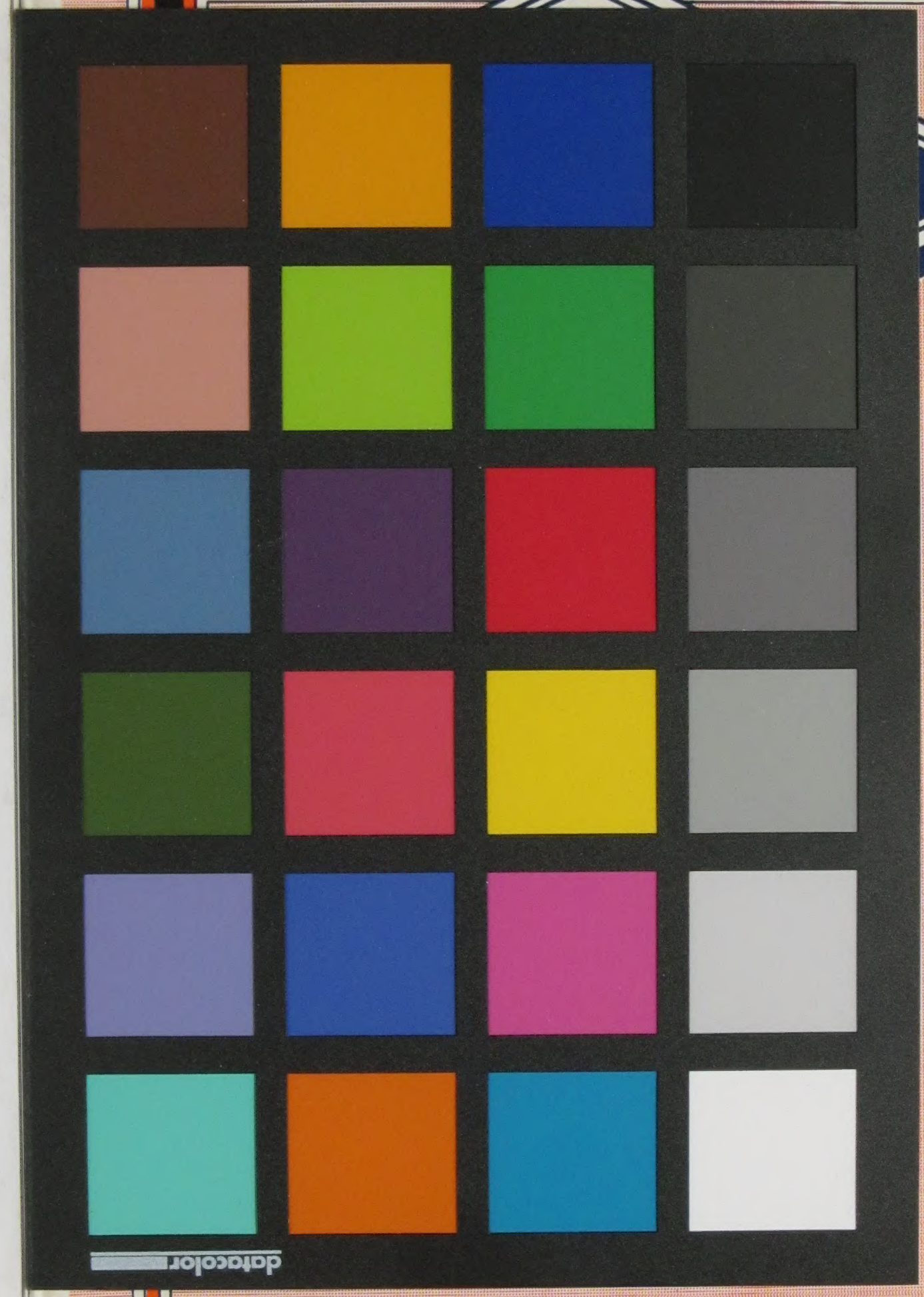
The nozzle is fastened to the inside pipe by a coupling and is rotated by means of the hand wheel. The blower is protected from hot gases. This applies to a brick set boiler.

MARION ROTARY SOOT BLOWER

NAME OF PART	Part No.
Head	5541
Base	5549
3½" pipe Variable Length	5546
2½" x 4" Ring	5548
2½" Pipe, Variable Length	5552
Yoke	5555
Valve Rod Tube—7/16"x⅞"x10½"	5538
Valve Rod—7/16"	5539
Valve Disc—Standard	5540
Valve Disc—Large	5542
Packing Nut—Large—2"	5537
Packing Nut—Small—⅞"	5538
Trigger	5535
Trigger Spring	5536
Protecting frames	5550
4 way handwheel — Standard	5543
3 way handwheel	5570
5 way handwheel	5571
6 way handwheel	5572
NOZZLES	
No. 1 Nozzle	5558
No. 2 Nozzle	5559
No. 3 Nozzle	5560
No. 4 Nozzle	5561
No. 5 Nozzle	5562
No. 6 Nozzle (Wicks Boiler)	5565
No. 20 Nozzle	5567
No. 30 Nozzle	5568
No. 40 Nozzle	5569
SPECIAL FOR STEEL DOORS	
Base	5545
Wall Plate	5574
Protecting Frame (Shallow)	5573

MARION MACHINE FDRY. & SUPPLY CO.
POWER PLANT AND OIL WELL
THE MARION LINE
EQUIPMENT
MARION, IND.

SECTION A



SECTION A

THE MARION LINE

Soot Blowers

FOR

All Inquiries Should Be Addressed To

H. O. TRERICE CO.

District Managers

1338 W. Lafayette Blvd., DETROIT, MICH.

TELEPHONE CADILLAC 8177

Night Calls Garfield 3460-W